School of Studies in Engineering and Technology
GURU GHASIDAS VISHWAVIDYALAYA
(A CENTRAL UNIVERSITY ESTABLISHED BY THE UNIVERSITIES ACT, 2009)
BILASPUR (C.G), 495009

Department of
COMPUTER SCIENCE & ENGINEERING

Bachelor of Technology Programme

STUDENT'S HANDBOOK

2021-2022

Preface

The School of Studies in Engineering & Tchnology, under Guru Ghasidas Vishwavidyalaya (now a Central University since 15th Jan., 2009), Bilaspur (C.G.), was set up in the year 1997 with an objective of making available the facilities of quality higher education in the field of Engineering and Technology to the students of, particularly, the Central region of country where the rural and tribal population still remain deprived of such facilities. The school, remaining fully conscious of its objectives and responsibilities, is growing towards the level of a centre of excellence for quality engineering education in the country. Especially, after up-gradation of the University as a Central University, there has been many fold enhancements in infrastructural facilities as well as faculty and staff. Today, the school has well equipped laboratories with latest equipment, a good library, adequate computational facilities and smart E-classrooms needed for ensuring quality in higher education and research. The mission of the Institute is to create an ambiance in which new ideas, research and scholarship flourish and to engender the leaders and innovators of tomorrow.

The University campus houses faculties like Arts, Science, Social Science, Humanities, Law and Management etc, our students get opportunities of studying varied nature of elective courses from other faculties, and are groomed to work not only with a group of technically trained people but also with persons having knowledge in different domains of education.

The school on an average, admits around 500 students annually for the 4 - year undergraduate B. Tech programme in seven branches. Admissions are made through Joint Entrance Examination-JEE (main) or the entrance examination conducted as per the directions of MHRD, Govt. of India. In School, M.Tech. programme is being run by all seven departments and the students who are Graduate Aptitude Test in Engineering (GATE) qualified get admitted. To keep pace with new developments and changes in the field of technology, the School revises its Undergraduate and Postgraduate Programmes syllabi from time to time. School follows semester system of teaching (odd- July - December and even- January – June).

Our school is a student-centric Institution and, therefore, the endeavor is always to ensure that students are offered the information on the existing Rules and Regulations governing the B.Tech. Programmes. The students and parents/ guardians are, therefore, advised in their own interest to get fully familiar with the academic system of the Institute and rules and regulations. Students' attention is particularly drawn to the attendance requirement, regular assessment procedures, conditions of promotion to higher semesters and grading system, etc.

Thank you for your interest in School of Studies in Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur. We wish all our students a very bright future and successful career.

Dean (SOS, Engg. & Tech.)

ABOUT THE DEPARTMENT

The Department of Computer Science & Engineering was established in 1997. The department offers B.Tech. in Computer Science & Engineering and Ph.D. in Computer Science & Engineering. The faculty of the Department is highly qualified and experienced. The Department has specialized laboratories such as Digital Image Processing Lab, DLD Lab, Networking Lab, Network Security Lab, Project Lab, Basic Programming Lab, Advance Programming Lab, Database Lab, Graphics Lab and Operating System Lab. The Department has licensed copies of DB2 Universal Database, Visual age for JAVA and web server applications. The Department provides opportunities to the students to carry out projects under joint supervision of the faculty and the experts from industries.

The Department also arranges training to students in reputed government and public sectors like DRDO Delhi, Microsoft Hyderabad, CMC Kolkata, Orbit IT Hyderabad, SECL, BSNL, Indian Railways, Bokaro Steel Plant and Bhilai Steel Plant. Students have been placed in reputed private, public and government organizations like Infosys, Wipro, Persistent, International Business Machines(IBM), TCS, Mahindra BT, Syntel, Satyam, BSNL,NTPC and INFLIBNET

Thrust Area

The Department's current research thrusts include:

- **Image and Video Processing**
- **Big Data Analytics**
- **Algorithms and Complexity**
- **Artificial Intelligence and Natural Language Processing**
- **Computer Network**
- **Parallel and Distributed Computing**
- **Security and Cryptography**
- **Software and Systems Engineering**
- **Objectives of the Department**

a) To prepare professionally competent manpower in the field of Computer Science & Engineering.
b) To educate students in Computer Science & Technology and other areas of scholarship that will best serve the nation and the world in 21st century.
c) To establish facilities for the education / training in the area of Computer Science & Engineering.

d) To conduct multidisciplinary programs in Computer Science & Engineering.

Students Achievements of Department :

A. Number of Students Qualified on Various Exams in academic year 2020-21:

Name of Exam	No. of Students
GATE	05
CAT	02
Placed in Company	11 (With highest Package of 23 L)

B. Courses Intake:

S.No.	Course	Year	Annual Intake
1.	B.Tech.	4 Year	75
2.	M.Tech.	2 Year	23
3.	PhD.		

ACADEMIC CALENDAR

For Odd Semester :

B. Tech. Odd Semester (2021-2022)

S.N.	Academic Plans	III Semester(Course A/B), as per CBCS	V&VII Semester, as per CBCS
01	Registration/Admission/Orientation / Induction Programme	04.10.2021 (Monday) to 08.01.2021 (Friday)	26.07.2021 (Monday) to 30.07.2021 (Friday)
02	Commencement of Classes	04.10.2021 (Monday)	26.07.2021 (Monday)
03	Class Test-I/Class Test (Internal Assessment)	08.11.2021 (Monday) to 13.11.2021 (Saturday)	30.08.2021 (Monday) to 04.09.2021 (Saturday)
04	Class Test-II/Mid Semester Examination (MSE) (Internal Assessment)	13.12.2021 (Monday) to 20.12.2021 (Monday)	20.10.2021 (Wednesday) to 26.10.2021 (Tuesday)
05	Last date for submission of End Semester Examination (ESE) form	As per the University notification	
06	Last date of classes	07.01.2022 (Friday)	26.11.2021 (Friday)
07	. Preparation leave	08.11.2022 (Saturday) to 09.01.2022 (Sunday)	27.11.2021 (Saturday) to 28.11.2021 (Sunday)
08	End Semester Examination (ESE)/Practical Examinations	10.01.2022 ((Monday) to 21.01.2022 (Friday)	29.11.2021 (Monday) to 10.12.2021 (Friday)
09	Declaration of End Semester Results	As per the University Notification	
10	Winter vacation	As per the University Notification	

Practical examination will be conducted prior to preparation leave.

*Only for students

For Even Semester:

B. Tech. Even Semester (2021-2022)

S.N.	Academic Plans	IV Semester(Course A/B), as per CBCS	VI&VIII Semester, as per CBCS
01	Registration/Admission/Orientation / Induction Programme	24.01.2022 (Monday) to 28.01.2022 (Friday)	13.12.2021 (Monday) to 17.12.2021 (Friday)
02	Commencement of Classes	24.01.2022 (Monday)	13.12.2021 (Monday)
03	Class Test-I/Class Test (Internal Assessment)	07.03.2022 (Monday) to 12.03.2022 (Saturday)	24.01.2022 (Monday) to 29.01.2022 (Saturday)
04	Class Test-II/Mid Semester Examination (MSE) (Internal Assessment)	18.04.2022 (Monday) to 23.04.2022 (Saturday)	14.03.2022 (Monday) to 19.03.2022 (Saturday)
05	Last date for submission of End Semester Examination (ESE) form	As per the University notification	
06	Last date of classes	13.05.2022 (Friday)	15.04.2022 (Friday)
07	Preparation leave	14.05.2022 (Saturday) to 18.05.2022 (Wednesday)	16.04.2022 (Saturday) to 20.04.2022 (Wednesday)
08	End Semester Examination (ESE)/Practical Examinations	19.05.2022 (Thursday) to 31.05.2022 (Tuesday)	21.04.2022 (Thursday) to 30.04.2022 (Saturday)
09	Declaration of End Semester Results	As per the University Notification	
10	Summer vacation	As per the University Notification	

✓ Sports/Cultural activity will be as per the University calendar.

FACULTY OF THE DEPARTMENT

Name	Qualification	Designation	Specialization	Photograph
Dr. Alok kumar singh Kushwaha	Ph.D. in Computer Science and Engineering	Associate Professor & HOD.	Image Processing, Computer Vision, Pattern Classification, Video Surveillance. Artificial Intelligence, Machine Learning, Deep Learning	
Dr. Manish Shrivastava	M.Tech., Ph.D.	Assistant Professor	Network Security	
Mr. Devendra Kumar Singh	M.Tech	Assistant Professor	Network Security	
Mr. Nishant Behar	M.Tech	Assistant Professor & Head	Network Security	
Mr. Vaibhav kant Singh	M.Tech	Assistant Professor	Data Mining	

Mrs. Nishi Yadav	M.Tech	Assistant Professor	MANET	
Mrs. Raksha Sharma	M.Tech	Assistant Professor	Grid Computing	
Mr. Amit Baghel	M.Tech	Assistant Professor	Ad-hoc Network	
Mr. Satish Kumar Negi	M.Tech	Assistant Professor	Ad-hoc Network	
Mr. Pushpendra Kumar Chandra	M.Tech	Assistant Professor	Computer Network, Machine Learning	
Mr. Manjit Jaiswal	M.Tech.	Assistant Professor	Parallel Computing	

Mrs. Princy Matlani	MTech, PhD	Assistant Professor	Image Processing	

B.TECH. ORDINANCE

Proposed Draft of
ORDINANCE No. -12
for
Bachelor of Technology (B.Tech.)
Under Choice Based Credit System(CBCS)
Governing the award for the Degree of Bachelor of Technology (B.Tech.)-4 years
(8 Semester)
Degree Course
(Ordinance prepared as per the provisions given in Statute 28(1) (b) of
The Central Universities Act, 2009)

1.0 TITLE AND COMMENCEMENT

1.1. The Ordinance shall be called as Ordinance for four years (Eight Semesters) B.Tech. Degree programme.

1.2. The first degree of four years (Eight Semester) programme in Engineering & Technology, hereinafter called 4- year B. Tech degree course, shall be designated as 'Bachelor of Technology' in respective Branches. The conduct of the programme and the performance evaluation of B. Tech. programmes are on the basis of percentage of marks earned as well as credit system.

1.3. This ordinance will come into force from the Academic Session commencing after the date of notification issued by the University and shall replace the existing ordinance.

2.0 DEFINITION & KEY WORDS

2.1 "*Vishwavidyalaya*" or "*University*" means Guru Ghasidas Vishwavidyalaya (A Central University established by the Central Universities Act, 2009 No. 25 of 2009) located at Koni, Bilaspur, Chhattisgarh.

2.2 "*Student*" means one who has been admitted in the four years B.Tech. programme of this University through merit list of Joint Entrance Examination (JEE) (main) or any other procedure decided by Guru Ghasidas Vishwavidyalaya for Admission to B. Tech. degree course time to time.

2.3 The candidate shall be eligible for admission on the basis of the *"Academic Year" means t*wo consecutive (one odd and one even) semesters.

2.4 *"Choice Based Credit System (CBCS)"* means a program that provides choice for students to select from the prescribed courses (Basic Science, Humanities, Engineering Science, Mandatory Courses, Professional Core, Open Elective, Professional Elective, etc.) as per the guidelines issued by UGC / AICTE / regulatory bodies where ever applicable and as approved by the appropriate bodies of the University.

2.5 *"Course"* means "papers" through different modes of delivery and is a component of a programme as detailed out in the respective program structure.

2.6 *"Credit Point"* means the product of grade point and number of credits for a course.

2.7 *"Credit"* means a unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching(lecture, seminar or tutorial) per week or two hours of practical work/field work/project etc. per week. The number of credits for each course shall be defined in the respective examination scheme.

2.8 *"Cumulative Grade Point Average* (*CGPA*)" means a measure of overall cumulative performance of a student in all semesters. The CGPA is the ratio of total credit points secured by a student in various courses registered up to the semester concerned and the sum of the total credits points of all the registered courses in those semesters concerned. It is expressed up to two decimal places.

2.9 *"Grade Point"* means a numerical weight allotted to each letter grade on a 10 point scale or as prescribed by the AICTE/ University from time to time.

2.10 *"Letter Grade"* means an index of the performance of students in a course. Grades are denoted by letters O, A+, A, B+, B, C, P, and F.

2.11 *"Semester Grade Point Average* (*SGPA*)" means a measure of performance of a student in a particular semester. It is the ratio of total credit points secured by a student in various courses registered in a semester and the total credits of all courses in that semester. It shall be expressed up to two decimal places.

2.12 *"Semester"* means an academic session spread over 15-18 weeks of teaching work with minimum 90 teaching days. The odd semester may normally be scheduled from July to December and even semester from January to June.

2.13 *"Grade Card"* means a certificate based on the grades earned. Grade card shall be issued to all the students registered for the examination after every semester. The grade card will contain the course details (code, title, number of credits, grade secured) along with SGPA of the semester and CGPA earned till that semester. The final semester grade card shall also reflect the cumulative total of marks obtained by the student in all semesters out of maximum marks allocated for which the grades of the program were evaluated. However, the final result will be based on the grades/CGPA.

2.14 *"Transcript"* means a certificate issued to all enrolled students in a program after successful completion of the program. It contains the SGPA of all semesters and the CGPA;

2.15 *"Ex-student"* means a student who fails to clear in the supplementary examination all the backlogs of theory, practical / sessional subjects of the odd and even semesters, he/she will not be promoted to the odd semester of the next higher year, and such student shall be treated as ex-student.

2.16 *"Sessional"* means a subject which is practiced by student in a semester for which there is no end semester exam.

3.0 DURATION

The duration of undergraduate (U.G.) degree programmes leading to B. Tech. degree, shall be normally four years and the maximum duration shall be 7 years from the date of initial registration in First year B.Tech. course. If a candidate will not be able to complete the course in the maximum duration of 7 years then he / she will not be eligible to continue the course from that point of time itself and he / she will automatically exit from the program.

4.0 ADMISSION PROCEDURE AND ELIGIBILITY

The minimum qualification for admission to the first year B. Tech. shall be the passing of Higher Secondary School Certificate Examination (10+2) scheme with Physics, Chemistry and Mathematics conducted by Central Board of Secondary Education or any other equivalent examination from recognized Board or University. The candidate shall be eligible for admission on the basis of the merit list of Joint Entrance Examination (JEE) (main) or any other procedure decided by Guru Ghasidas Vishwavidyalaya for Admission to B. Tech. degree course time to time. In general the admission to B. Tech. degree course shall be governed by the rules of, MHRD, Government of India (GoI) and Guru Ghasidas Vishwavidyalaya. The reservations in admission, cancellation of admission and fee refund will be as per MHRD, GoI / GGV norms and notifications issued in this regard from time to time.

5.0 ENROLMENT IN THE UNIVERSITY

Every student admitted to the programme shall be enrolled before appearing in the first semester examination through the procedure prescribed by the competent authority from time to time.

6.0 TYPES OF COURSES

Basic Science, Humanities, Engineering Science, Mandatory Courses, Professional Core, Open Elective, Professional Elective, etc. as per the guidelines issued by AICTE / University where ever applicable and as approved by the appropriate bodies of the University.

7.0 ATTENDANCE AND ELIGIBILITY TO APEAR IN THE EXAMINATION

A Student shall be required to attend at least 75% of the classes actually held in the semester which may include theory class, seminars, sessionals, practicals, projects, as may be prescribed.
Provided that the Dean of the School of Engineering & Technology on the recommendations of the concerned Head of the Department may condone the shortage in attendance of those students who have secured at least 65% attendance. This condonation should not exceed 10% on the following satisfactory grounds.

a) Illness / Medical leave of the student certified by the University Medical Officer / Government Doctor.
b) Unforeseen miss happening with parents.
c) For participating in the extra and co-curricular events with prior approval from the university authority.
d) For participating in the sports activity with prior approval from the university authority.
e) For attending in interviews with valid proof and prior permission of the concerned head of department.
f) Natural calamities.

The application must be supported by such documents as considered to be fit for granting such condonation.

7.1. A student who does not satisfy the requirement of attendance as per clause above, he/she will be detained due to shortage of attendance in a particular semester and he/she will have to repeat the same semester taking re-admission as a regular student in the next commencing academic session by paying fee as per the University norms.

8.0 EXTRA ORDINARY LONG ABSENCE

If a student does not participate in the academic activities of the School of Studies of Engineering and Technology of this Vishwavidyalaya for a period exceeding two years for reasons of ill health or medical grounds only, he / she shall neither be permitted to appear in any subsequent examinations nor shall be admitted or promoted to any semester and he / she shall cease to be a student of B. Tech. Degree Course. Here participation in academic activity means attending Lectures, Tutorials, Practicals/Sessionals and such other activities declared as academic activities.

9.0 MEDIUM OF INSTRUCTION/EXAMINATION

Medium of instruction and examination shall be English only.

10.0 EXAMINATION AND EVALUTION

10.1 Practical/ Sessional Work – The student shall be required to complete the Laboratory / Drawing / Design / Job preparation and other academic work assigned for that semester in the session.

10.2 There shall be a full End Semester Examination at the end of each semester consisting of theory papers, practicals/ sessionals.

10.3 There shall be one End Semester Examination (ESE) at the end of each semester conducted by Guru Ghasidas Vishwavidyalaya. Only those students, who will satisfy the attendance requirement to be eligible to appear at the End Semester Examination as per clause 7.0, will be permitted to appear in the End Semester Examination. The examination will consist of theory papers, laboratory practical/sessional and viva-voce as per the scheme of examination of that semester. These examinations shall be designated as follows.

(a). During First year - I & II sem. B. Tech. Examination
(b). During Second year - III & IV sem. B. Tech Examination
(c). During Third year - V & VI sem. B. Tech. Examination
(d). During Fourth year - VII & VIII sem. B. Tech. Examination

10.4 The semester examination will normally be held in the month of November-December and April – May in every academic session, or as decided by the University from time to time.

10.5 Supplementary examination will be held only once in a year (for both even and odd semesters) normally in the month of June/July or as decided by the University from time to time.

10.6 End Semester Examination time table shall be declared by the Controller of Examination before the commencement of examination.

10.7 Basis of Subjects Evaluation

10.7.1 For passing in a subject (theory / practical/sessional) the performance of the candidate in each semester shall be evaluated subject wise. There shall be continuous assessment throughout the semester by conducting class tests, called as Internal Assessment (I.A.) carrying 30% weightage, and End Semester Examination (E.S.E.) carrying 70% weightage. A student has to secure minimum 35% (24 marks) in the particular theory
subject and minimum 40% marks in a particular practical subject to pass that subject in
the end semester examination. For each practical/sessional subject 60% weightage will be given to the actual practicals /sessionals performed during the semester I.A. and 40% weightage will be given to the End Semester Examination (ESE).

10.7.2 For evaluation of end semester practical/sessional examination of a subject, there shall be two examiners, one internal examiner who has conducted the practical in that semester and other external examiner to be appointed by the Head of the Department from amongst faculty members of the department concerned.

10.7.3 To allot the marks of Internal Assessment (IA), there shall be two Class Tests (CT) I & II each of 15 marks.

10.7.4 For passing a subject the student is required to fulfill the following conditions:
   a) Student has to secure minimum 35% (24 marks) in a particular theory subject to pass that subject in the end semester examination.
   b) Student has to secure minimum 40% marks in a particular practical / sessional subject to pass that subject (practical / sessional) in the end semester examination.
   c) Must have secured minimum 40% marks (Marks of Internal Assessment + Marks of End Semester Examination) for each theory subject.
   d) Must have secured minimum 50% marks (Marks of Internal Assessment + Marks of End Semester Examination) for each project/practical/sessional subject.
   e) Must have scored minimum SGPA of 5.0 in the semester. If a student has cleared all the failed to secure SGPA of 5.0 in the semester or and semesters of a year then he/she will be allowed to re-appear in the supplementary Examination in those

subjects in which the student's Grade Points less than 5. If the student fails to secure SGPA of 5.0 even in the supplementary examination, he/she will not be promoted to the odd semester of the next higher year, and such student shall be treated as an ex-student. Other condition of

f) promotion of the ex-student will be applicable as per Clause 11.

g) (f) If a student has passed a semester examination in all the subjects as per clause 10.7.4 (ae), he/she shall not be permitted to reappear in that examination for improvement in

h) grades/division.

10.7.5 Basis of Credits- Credit of a theory or practical/sessional subject is decided by:

Credit = (L+ T+P/2),

Where; L = Lecture periods per week,

T = Tutorial period per week,

P = Practical/Sessional periods per week.

Credit in a subject will be an integer, not in a fractional number. If a credit in a subject turns out in fraction, it will be taken as next integer number.

10.7.6 For Theory Subjects-For the assessment of performance of students in a semester, continuous evaluation system will be followed with two components: Internal Assessment (IA), carrying 30% weightage and End Semester Examination (ESE), carrying 70% weightage. There will be two class tests each of 15 Marks, in each theory subject in a semester forming the part of Internal Assessment (IA).

10.7.7For Projects/Practical/ Sessional Subjects- Evaluation of project/practical/sessional during the semester will carry 60% weightage for Internal Assessment (IA) and the End Semester Examination (ESE) will carry 40% weightage. The internal assessment will carry equal weightage of attendance (20% weightage), practical records (20% weightage) and internal viva – voice examination (20% weightage). The marks for attendance shall be awarded in project/practical/sessional subject as per the following Table.

Percentage of attendance	65 - ≤ 75	> 75 - ≤ 80	>80- ≤ 85	>85- ≤ 90	>90- ≤ 95	>95-≤ 100
Percent weightage of Marks	10	12	14	16	18	20

10.7.8 Grading System- Percentage as well as absolute grading system will be followed, in every subject, theory or practical/sessional. A student will be awarded a **Letter Grade**, based on his combined performance of Internal Assessment (IA) and End Semester Examination (ESE). These grades will be described by letters indicating a qualitative assessment of the student's performance through a number equivalent called "Grade Point" (GP) as given below. The following is the **Grade Point** pattern. Grade 'F' indicates not clearing (passing) of the subject.

Letter Grade (LG)	O	A+	A	B+	B	C	P	F	Ab
Grade Point	10	9	8	7	6	5	4	0	0

The Letter Grades are O (Outstanding), A+ (Excellent), A (Very Good), B+ (Good), B(Above Average), C (Average), P (Pass), F(Fail) and Ab (Absent in end semester examination). Grades will be awarded for every theory and practical/sessional subject separately.

10.7.9 Absolute Grading System

(a) The Absolute Grading System as explained below will be adopted for theory and project/practical/sessional subjects.

GRADE	Percentage of Marks Obtained	
	THEORY	PRACTICAL/SESSIONAL/PROJECT
O (Outstanding)	>90- ≤100	>90-≤ 100
A'(Excellent)	>80 - < 90	>80-< 90
A (Very Good)	>70 - ≤ 80	>70 - ≤ 80
B'(Good)	>60 -≤ 70	>60- ≤ 70
B (Above Average)	>50- ≤ 60	>55- ≤ 60
C (Average)	>40-≤ 50	>50-≤ 55
P (Pass)	=40	=50
F (Fail)	00 - <40	0 - < 50

(b) 01 Grace Mark shall be given only once at the time of award of the degree to improve the Grade in overall result.

10.7.10 Semester Grade Point Average (SGPA)- Performance of a student in i_{th} semester is expressed by $[SGPA]_i$ which is a weighed average of course grade points obtained by a student in the semester, and is expressed by

$$[SGPA]_i = \frac{\left[C_1 G_1 + C_2 G_2 + \ldots\ldots\ldots\right]}{\left[C_1 + C_2 + \ldots\ldots\ldots\right]} = \frac{\left[\sum C_j G_j\right]}{\left[\sum C_j\right]} = \frac{N_i}{D_i}$$

Where C_j stands for Credit and G_j stands for Grade points corresponding to j_{th} subject in a semester. SGPAs will be calculated up to two places of decimal without rounding off. SGPA will be calculated only when a student clears a semester without failing in any subject, theory or practical/sessional/project.

10.7.11 Cumulative Grade Point Average (CGPA)- This is a weighed average of course grade points obtained by a student for all the courses taken, since his / her admission. Thus, CGPA in the i_{th} semester with "i ≥2" will be calculated as follows:

$$[CGPA]_i = \frac{\sum\limits_{k=1}^{k=i} N_k}{\sum\limits_{k=1}^{k=i} D_k}$$

If a student repeats a course or is declared fail in a subject, then only the grade points earned in the attempt when he / she cleared the course (subject) are counted towards CGPA. CGPA will be calculated in every semester along with SGPA, so that a student knows his / her latest CGPA.

11 PROMOTION TO NEXT YEAR AND SEMESTER

11.1 Those students who have cleared all the registered theory, practical/sessional subjects prescribed for the B.Tech. first year shall be promoted to the B.Tech. second year. Those students who have cleared all the registered theory, practical/sessional subjects prescribed for the B.Tech. second year shall be promoted to the B.Tech. third year. Those students who have cleared all the registered theory, practical/sessional subjects prescribed for the B.Tech. third year shall be promoted to the B.Tech. fourth year.

11.2 Supplementary examinations will be held only once in a year (for both even and odd semesters) normally in the month of July after declaration of results of even semester examination of the incumbent session, or as decided by the University time to time.

11.3 Those students who would have backlogs in registered theory and/ or practical/ sessional subjects in the odd and or even semesters of any academic year will be allowed to appear in the supplementary examinations of the same year.

11.4 Those B.Tech. students who are allowed to appear the supplementary examination (of odd or even or both semester**),** may be allowed to attend the classes provisionally of the next higher odd semester of the next year. However, such provisionally permitted students will get their regular admission only after passing in all their backlog papers in supplementary examination, if eligible otherwise. The percentage of attendance shall be counted from the date of commencement of the semester classes.

11.5 If a student fails to clear in the supplementary examination all the backlogs of theory, practical/sessional subjects of the odd and even semesters, he/she will not be promoted to the odd semester of the next higher year, and such student shall be treated as ex-student.

11.6 Ex-students, {as per clause 10.7.4(e)}, shall be required to clear their backlog papers (theory and or practical/sessional subjects), in the end semester examination of the corresponding semesters (odd and even) and supplementary examination to be conducted next year (in the following academic session). Such ex-students will be required to deposit the examination fees only.

11.7 If a student fails to appear in the internal assessment / sessional of a semester due to

unforeseen incident, a makeup test/examination may be conducted, if required, strictly on the recommendation of the concerned Head of the Department, and approval of the Dean (Engineering & Technology).

12 AWARD OF CLASS OR DIVISION

12.1 The class/division awarded to a student with B. Tech. Degree shall be determined by the student's CGPA after clearing all the subjects of all the eight semesters, as given below:
- First Division with Distinction or **Honours** : 7.5 ≤CGPA ≤ 10.0
- First Division : 6.5 ≤CGPA< 7.5
- Second Division : 5.0 ≤ CGPA< 6.5

12.2 Division shall be awarded to a student only after clearing all the eight semesters successfully, and having earned at least total credit of **160** for the award of B.Tech. degree. It shall be based on the integrated performance of the candidate for all the eight semesters as per clause 10.3.

12.3 No student shall be declared to have passed the final B.Tech. course unless he/she has fully passed all the eight semesters. The results of the eighth semester of those students, who have not passed examination in any previous semester, will be withheld. Such students shall be deemed to have passed the final B.Tech. examination in the year in which they pass / clear all the subjects of all the eight semesters, within the limit of the prescribed period of the whole course.

13 TRANSCRIPT

Based on the Letter grades, grade points and SGPA and CGPA, the Vishwavidyalaya shall issue the transcript for each semester and a consolidated transcript indicating the performance in all semesters.

14 CONVERSION OF CGPA / SGPA IN PERCENTAGE

There is no equivalence between the CGPA/SGPA scale and percentage. However notionally, Percentage of particular semester = (SGPA) × 10
Percentage of B.Tech. Degree = (CGPA) × 10

15 RANKING

Only such candidates who complete successfully all courses in the programme in single attempt shall be considered for declaration of ranks, medals etc declared and notified by the university, if any.

16 DISCIPLINE

- Every student is required to observe discipline and decorous behavior both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the Institute.

- Any act of indiscipline of a student reported to the concerned Head / Dean (Engineering & Technology), will be investigated and necessary action will be taken as per university rules from time to time.
- Ragging of any dimension is a criminal and non-bailable offence in our country. The current State and Central legislations provide for stringent punishment, including imprisonment. Once the involvement of a student is established in ragging, the offending student will be dismissed from the University and will not be admitted into any other Institution. Avenues also exist for collective punishment, if individuals can not be identified in this inhuman act. Every senior student, along with the parent, shall give an undertaking every year in this regard and this should be submitted at the time of admission / registration.

17 REGISTRATION REQUIREMENTS

- Every student is required to be present and register at the commencement of each semester on the day(s) fixed for and notified in the Academic Calendar from time to time.
- Late registration will be permitted with a fine as decided from time to time up to three weeks from the date of commencement of each semester as notified in the Academic Calendar from time to time. If the student does not register in the specified time he / she has to be registered in the next year in the same semester.
- Percentage attendance for all students will be counted from the date of commencement of the semester, irrespective of his/her date of registration. However, in case of first year first semester, attendance will be counted from date of admission into the School or date of commencement of class work, whichever is later.
- Minimum 4 weeks Industrial training/Internship in during summer break is compulsory after end semester examination of sixth semester. The student has to submit the industrial training / Internship report to the concerned department at the time of registration in the seventh semester and required to defend his/her industrial training/Internship during seventh semester in the department.
- If a student finds his/her academic/course load heavy in any semester, or for any other valid reason, he/she may drop courses within 15 instructional days from the commencement of the semester with the recommendation of his/her Head of Department and approval of the Dean, Engineering & Technology.
- The curriculum for any semester, except for the final semester will normally carry credits between 21 to 29.
- Minimum number of credits that a student can register in any given semester (excepting for final semester) is 15. Maximum number of credits that can be registered in a semester is 29. However, in the final semester, a student may earn less than 15 credits if it is sufficient for him/ her to fulfill the requirements for the award of the degree.
- A student who has successfully secured *CGPA* equal and more than 7.0 in his/her First Year courses, can be registered for non credit courses in other departments of the university for

his/her higher semesters of study. The registration in non credit courses will be done after recommendation of Head of the Department and approval of the Dean, Engineering & Technology followed by the same of the Head of the Department concerned of the non credit course offered in. The student has to attend the classes of the non credit courses in addition to the fulfilling the requirements of registered regular subjects in his/her department prescribed by the Head of Department. For non credit courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

18 TRANSFER OF CREDITS

With due approval the courses studied through on line / off line like Massive Open online
Courses (MOOCS) through National Programme on Technology Enhanced Learning (NPTEL) under Study Webs of Active –Learning for Young Aspiring Minds (SWYAM) in Indian/ Foreign University/Institutions by the students during their study period at GGV Bilaspur (C.G.) may count towards the credit requirements for the award of B.Tech. degree. The credit transferred will reduce the number of courses to be registered by the student at GGV. The guidelines for such transfer of credits are as follows.

- On successful completion of the courses opted by students under SWYAM, the credits earned by them shall be included in their Grade card.
- Credits transferred will not be used for SGPA/CGPA computations except SWYAM.
  However, credits transferred will be considered for overall credits requirements of the programme.
- Students can earn credits only from other department of the University (GGV) /
IISC/IITs/NITs/Central Universities and other Indian and Foreign Institutions/Universities
with which GGV has an MOU (and that MOU must have specific clauses for provisions of
credit transfer by students).
- Credit transfer can only be considered for the courses at same level (i.e., UG, PG, etc.).

19 INTERPRETATION OF REGULATION

In case of any dispute in the matter of interpretation of this Ordinance, the decision of the Vice-Chancellor of the University shall be final and binding on the students.

20 POWER TO MODIFY

Notwithstanding all that has been stated above, the Academic Council of the University has the right to propose any modifications or amendments to the Executive Council for final decision of the above regulations and further actions from time to time.

21 Matters not covered in this Ordinance shall be governed by the relevant ordinance of the University.

Draft Ordinance
for Governing the award for the Degree of Bachelor of Technology (B.Tech.)-4 years (8 Semester) Degree Course as per Choice Based Credit System
(Old-CBCS)

1.0 GENERAL

The first degree of four years (Eight Semester) Course in Technology, hereinafter called 4- year B.Tech degree course, shall be designated as 'BACHELOR OF TECHNOLOGY' inrespective Branches. The conduct of the programme and the performance evaluation of B. Tech. courses are on the basis of percentage of marks earned as well as credit system.

2.0 ADMISSION

The minimum qualification for admission to the first year B. Tech. shall be the passing of Higher Secondary School Certificate Examination (10+2) scheme with Physics, Chemistry and Mathematics conducted by Central Board of Secondary Education or any other equivalent examination from recognized Board or University. The candidate shall be eligible for admission on the basis of the merit list of Joint Entrance Examination (JEE) (main) or any other entrance examination decided by Guru Ghasidas Vishwavidyalaya for Admission to B. Tech. degree course time to time. In general the admission to B. Tech. degree course shall be governed by the rules of, MHRD, Govrenment of India (GoI) and Guru Ghasidas Vishwavidyalaya.

The reservations in admission, cancellation of admission and fee refund will be as per MHRD, GoI norms and notififications issued from time to time.

3.0 ATTENDANCE REQUIREMENT

3.1 A Student shall be required to attend at least 75% of the classes actually held in the semester which may include theory class, seminars, sessionals / practicals/projects, as may be prescribed.

Provided that the Dean of the School of Engineering & Technology on the recommendations of the concerned Head of the Department may condone the shortage in attendance of those students who have secured 65% attendance. This condonation should not exceed 10% on the following satisfactory grounds.

(a) Illness / Medical leave of the student.

(b) Unforseen mishappening with parents.

(c) For participating in the extra co-curricular events with prior approval from the university authority.

(d) For participating in the sports activity with prior approval from the university authority

(e) For attending in interviews with valid proof and prior permission of the concerned head of department.

3.2 A student who does not satisfy the requirement of attendance as per clause 3.1, he/she will be detained due to shortage of attendance in a particular semester and he/she will have to repeat the same semester taking re-admission as a regular student in the next commencing academic session.

4.0 DURATION

The duration of undergraduate (U.G.) degree programmes leading to B. Tech. degree, shall be normally four years and the maximum duration shall be 8 years from the date of initial registration in First year B.Tech. course. If a candidate will not be able to complete the course in the maximum duration of 8 years then he / she will not be eligible to continue the course from that point of time itself.

5.0 EXTRA ORDINARY LONG ABSENCE

If a student does not participate in the academic activities of the School of Studies of Engineering and Technology of this Vishwavidyalaya for a period exceeding two years for reasons of ill health or medical grounds only, he / she shall neither be permitted to appear in any subsequent examinations nor shall be admitted or promoted to any semester and he / she shall cease to be a student of B. Tech. Degree Course. Here participation in academic activity means attending Lectures, Tutorials, Practicals/Sessionals and such other activities declared as academic activities.

6.0 DISCIPLINE

o   Every student is required to observe discipline and decorous behavior both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the Institute.

o   Any act of indiscipline of a student reported to the concerned Head /Dean (Engineering & Technology), will be investigated and necessary action will be taken as per university rules from time to time.

o   Ragging of any dimension is a criminal and nonbailable offence in our country. The current State and Central legislations provide for stringent punishment, including imprisonment. Once the involvement of a student is established in ragging, the offending student will be dismissed from the University and will not be admitted into any other

Institution. Avenues also exist for collective punishment, if individuals can not be identified in this inhuman act. Every senior student, along with the parent, shall give an undertaking every year in this regard and this should be submitted at the time of admission / registration.

7.0 REGISTRATION REQUIREMENTS

o   Every student is required to be present and register / enroll at the commencement of each semester on the day(s) fixed for and notified in the Academic Calendar from time to time.

o   Late registration will be permitted with a fine as decided from time to time up to three weeks from the date of commencement of each semester as notified in the Academic Calendar from time to time. If the student does not register in the specified time he / she has to be registered in the next year in the same semester.

o   Percentage attendance for all students will be counted from the date of commencement of the semester, irrespective of his/her date of registration. However, in case of first year, first semester, attendance will be counted from date of admission into the Institute or date of commencement of class work, whichever is later.

o   Minimum 4 weeks Industrial training during summer break is complsary after end semester examination of six semester. The student has to submit the industrial training report to the concerned head of department at the time of registration in the seventh

semester.

o   If a student finds his / her academic / course load heavy in any semester, or for any other valid reason, he/she may drop courses within 15 instructional days from the commencement of the semester with the recommendation of his / her Head of Department and approval of the Dean, Engineering & Technology.

o   The curriculum for any semester, except for the final semester will normally carry credits between 21 to 29.

o   Minimum number of credits that a student can register in any given semester (excepting for final semester) is 15. Maximum number of credits that can be registered in a semester is 29. However, in the final semester, a student may earn less than 15 credits if it is sufficient for him/ her to fulfill the requirements for the award of the degree.

o   A student who has successfully secured *Cumulative Performance Index (CPI)* equal and more than 7.0 in his / her First Year courses, can be registered for non credit courses in other departments of the university for his / her higher semesters of study. The registration

in non credit courses will be done after recommendation of Head of the Department and approval of the Dean, Engineering & Technology and with the permission of the concerned subject teacher. The student has to attend the classes of the non credit courses in addition to the fulfilling the requirements of registered regular subjects in the his/her department prescribed by the Head of Department. For non credit courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of Semester Performance Index (SPI) / CPI.

8.0 EXAMINATIONS

8.1. Medium of Instruction/Examination – Medium of instruction and examination shall be English only.

8.2. Practical/ Sessional Work – The student shall be required to complete the Laboratory / Drawing / Design / Job preparation and other academic work assigned for that semester in the session.

8.3. There shall be a full End Semester Examination at the end of each semester consisting of theory papers, practicals/ sessionals.

8.4. There shall be one End Semester Examination (ESE) at the end of each semester conducted by Guru Ghasidas Vishwavidyalaya. Only those students, who will satisfy the attendance requirement to be eligible to appear at the End Semester Examination as per clause 3.0, will be permitted to appear in the End Semester Examination. The examination will consist of theory papers, laboratory practical/sessional and viva-voce as per the scheme of examination of that semester. These examinations shall be designated as follows.

(a). During First year   - I & II sem. B. Tech. Examination

(b). During Second year   - III & IV sem. B. Tech Examination

(c). During Third year   - V & VI sem. B. Tech. Examination

(d). During Fourth year   - VII & VIII sem. B. Tech. Examination

8.5. The semester examination will normally be held in the month of November-December and April – May in every academic session, or as decided by the University time to time.

8.6. Supplementary examination will be held only once in a year (for both even and odd semesters) normally in the month of July.

8.7. End Semester Examination time table shall be declared by the Controller of Examination before the commencement of examination.

9.0 PASSING OF EXAMINATION

9.1 Basis of Subjects Evaluation

9.1.1. For passing in a subject (theory / practical/sessional) the performance of the candidate in each semester shall be evaluated subject wise. There shall be continuous assessment throughout the semester by conducting quizzes / class tests / surprise test / assignments / seminar, etc. and mid semester examination, called as Internal Assessment (I.A.) carrying 40% weightage, and End Semester Examination (E.S.E.) carrying 60% weightage. A student has to secure minimum 35% marks in the particular theory subject and minimum 40% marks in a particular practical subject to pass that subject in the end semester examination. For each practical / sessional subject 60% weightage will be given to the actual practicals/sessionals performed during the semester I.A. and 40% weightage will be given to the End Semester Examination(ESE).

9.1.2. For evaluation of end semester practical / sessional examination of a subject, there shall be a panel of three examiners appointed by Head of the Department. All the three examiners shall be internal from the concerned department of the Institute of Technology, or external examiners may also be appointed.

9.1.3. To allot the marks of Internal Assessment (IA), there will be one Mid Semester Examination (MSE) in each theory subject of that semester, apart from one Class Tests (CT) and surprise test / assignments / quize.

9.2 Passing Marks in a Subject

For passing a subject the student is required to fulfill the following conditions:

(a) Student has to secure minimum 35% marks in a particular theory subject to pass that subject in the end semester examination.

(b) Student has to secure minimum 40% marks in a particular practical / sessional subject to pass that subject (practical / sessional) in the end semester examination.

(c) Must have secured minimum 40% marks (Marks of Internal Assessment + Marks of End Semester Examination) for each theory subject.

(d) Must have secured minimum 50% marks (Marks of Internal Assessment + Marks of End Semester Examination) for each project/practical/sessional subject.

(e) Must have scored minimum Semester Performance Index (SPI) of 5.0 in the semester.

If a student has cleared all the Theory and Practical/Sessional subjects of one or and both semesters of a year, but has failed to secure SPI of 5.0 in the semester or and semesters of a year then he/she will be allowed to re-appear in the supplementary Examination in those subjects in which the student's Grade Point is less than 5. If the student fails to secure SPI of 5.0 even in the supplementary examination, he/she will not be promoted to the odd semester of the next higher year, and such student shall be treated as an ex- student. Other condition of promotion of the ex-student will be applicable as per Clause 12.

(f) If a student has passed a semester examination in all the subjects as per clause 9.2 (a-e), he/she shall not be permitted to reappear in that examination for improvement in grades/division.

9.3 Basis of Credits

Credit of a theory or practical/sessional subject is decided by:

Credit = {L+ (T+P)/2}, where L = Lecture periods per week, T = Tutorial period per week, P = Practical/Sessional periods per week. Credit in a subject will be an integer, not in a fractional number. If a credit in a subject turns out in fraction, it will be taken as next integer number.

10.0 ASSESSMENT AND GRADING

10.1. Mode of Assessment and Evaluation

10.1.1 For Theory Subjects

For the assessment of performance of students in a semester, continuous evaluation system will be followed with two components : Internal Assessment (IA), carrying 40% weightage and End Semester Examination(ESE), carrying 60% weightage. There will be one class tests (10 marks), one mid semester examination (20 marks) and teacher assesment (05 marks for attendance and 05 marks on surprise test / assignmrents /quizes etc.) in each theory subject in a semester forming the part of Internal Assessment (IA). The marks for attendance shall be awarded in a theory subject as per the following Table.

Percentage of attendance	65 - ≤ 75	> 75 - ≤ 80	>80 - ≤ 85	>85- ≤ 90	>90- ≤ 95	>95- ≤ 100
Marks to be awarded	NIL	01	02	03	04	05

10.1.2. For Projects/Practical/ Sessional Subjects

Evaluation of project/practical/sessional during the semester will carry 60% weightage for Internal Assessment (IA) and the End Semester Examination (ESE) will carry 40% weightage. The internal assessment will carry equal weitage of attendance (20% weightage), practical records (20% weightage) and internal viva – voice examination (20% weightage). The marks for attendance shall be awarded in a projects/practical/sessional subject as per the following Table.

Percentage of attendance	65 - ≤ 75	> 75 - ≤ 80	>80- ≤ 85	>85- ≤ 90	>90- ≤ 95	>95- ≤ 100
Percent weightage of Marks	10	12	14	16	18	20

10.1.3. Grading System

Percentage as well as absolute grading system will be followed, in everysubject, theory or practical/sessional. Astudent will be awarded a **Letter Grade**,based on his combined performance of Internal Assessment (IA) and End Semester Examination (ESE). These grades will be described by letters indicating a qualitative assessment of the student's performance through a number equivalentcalled "Grade Point" (GP) as given below. The following is the **Grade Point** pattern. Grade 'F' indicates not clearing (passing) of the subject.

Letter Grade (LG)	O	A+	A	B+	B	C	P	F	Ab
Grade Point	10	9	8	7	6	5	4	0	0

The Letter Grades are O (Outstanding), A+ (Excellent), A (Very Good), B+ (Good), B (Above Average), C (Average), P (Pass), F (Fail) and Ab (Absent in end semester examination).
Grades will be awarded for every theory and practical/sessional subject separately.

10.2. Absolute Grading System

(a) The Absolute Grading System as explained below will be adoptedfor theory and project/practical/sessional subjects.

GRADE	Percentage of Marks Obtained	
	THEORY	PRACTICAL/SESSIONAL/PROJECT
O (Outstanding)	90 ≤ 100	90 ≤ 100
A$^+$ (Excellent)	80 - < 90	80 - < 90
A (Very Good)	70 - < 80	70 - < 80
B$^+$ (Good)	60 - < 70	60 - < 70
B (Above Average)	50 - < 60	55 - < 60
C (Average)	40 - < 50	50 - < 55
P (Pass)	= 40	= 50
F (Fail)	0 - < 40	0 - < 50

(b) 01 Grace marks shall be given only once at the time of award of the degree to improve the Grade in overall result.

10.3. Semester Performance Index (SPI)

Performance of a student in ith semester is expressed by [SPI]$_i$ which is aweighted average of course grade points obtained by a student in thesemester, and is expressed by

$$[SPI] = \frac{[C_1G_1 + C_2G_2 + \_\_\_]}{[C_1 + C_2 + \_\_\_]} = \frac{\left[\sum C_j G_j\right]}{\left[\sum C_j\right]} = \frac{N}{D}$$

Where C$_j$ stands for Credit and G$_j$ stands for Grade points corresponding to jth subject in a semester. SPIs will becalculated up to two places of decimal without rounding off. SPI will becalculated only when a student clears a semester without failing in any subject, theory or practical/sessional.

10.4. Cumulative Performance Index (CPI)

This is a weighted average of course grade points obtained by a student forall the courses

taken, since his / her admission. Thus, CPI in the ith semester with "i" greater than 2 will be calculated as follows

$$[CPI] = \frac{\sum\limits_{j=1}^{i-1} N_k}{\sum\limits_{k=1}^{i-1} D_k}$$

If a student repeats a course or is declared fail in a subject, then only thegrade points earned in the attempt when he / she cleared the course / subject are counted towards CPI. CPI will be calculated in every semester along with SPI, so that a student knows his / her latest CPI.

10.5. Award of Class or Division

10.5.1.   The class/division awarded to a student with B. Tech.Degree shall be determined

by the student's CPI after clearing all the subjects of all the eight semesters, as given below:

- First Division with Distinction or **Honours**   : 7.5 ≤CPI ≤ 10.0
- First Division   : 6.5 ≤ CPI < 7.5
- Second Division   : 5.0 ≤ CPI < 6.5

10.5.2.   Division shall be awarded to a student only after clearing all the eight semesters successfully, and having earned at least a total credit of **190** for the award of B.Tech. degree. It shall be based on the integrated performance of the candidate for all the eight semesters as per clause 10.5.1.

10.5.3.   No student shall be declared to have passed the final B.Tech. course unless he/she has fully passed all the eight semesters. The results of the eighth semester of those students, who have not passed examination in any previous semester, will be withheld. Such students shall be deemed to have passed the final B.Tech. examination in the year in which they pass / clear all the subjects of all the eight semesters, within the limit of the prescribed period of the whole course.

10.6. Conversion of CPI / SPI in Percentage

There is no equivalence between the CPI/SPI scale and percentage. However notionally,

Percentage of particular semester $= (SPI) \times 10$

Percentage of B.Tech. Degree $= (CPI) \times 10$

11.0 TRANSFER OF CREDITS

The courses credited in Indian or Foreign University/Institutions by students during their study period at GGV Bilaspur (C.G.) may count towards the credit requirements for the award of B.Tech. degree. The credit transferred will reduce the number of courses to be registered by the student at GGV. The guidelines for such transfer of credits are as follows.

o   B.Tech students with consistent academic performance and CPI greater than 7.5 can credit courses approved by the Dean, Engineering & Technology, in other Institutions during 3rd and 4th year and during summer breaks.

o   Credits transferred will not be used for SPI/CPI computations. However, credits transferred will be considered for overall credits requirements of the programme.

o   Students can earn credits only from other department of the University (GGV) / IISC/IITs/NITs/Central Universities and other Indian and Foreign Institutions/Universities with which GGV has an MOU (and that MOU must have specific clauses for provisions of credit transfer by students).

o   Credit transfer can only be considered for the courses at same level (i.e., UG, PG, etc.).

o   The maximum number of credits that can be transferred by a student shall be limited to 15.

o   A student has to get minimum passing grades/ marks for such courses for which the credits transfer are to be made.

o   The credits / grades indicated in the grade sheet obtained from the university in which the student has completed the courses should be used by the student as part of his/her transcripts.

o   The GGV transcripts will only indicate the courses, credits and grades completed at GGV and the total no. of credits earned in other Universities in a particular semester.

12.0 PROMOTION TO HIGHER YEAR AND HIGHER SEMESTER

12.1. Those students who have cleared all the registered theory, practical/sessional subjects

prescribed for the B.Tech. first year shall be promoted to the B.Tech. second year. Those students who have cleared all the registered theory, practical/sessional subjects prescribed for the B.Tech. second year shall be promoted to the B.Tech. thired year. Those students who have cleared all the registered theory, practical/sessional subjects prescribed for the B.Tech. third year shall be promoted to the B.Tech. fourth year-

12.2. Supplementary examinations will be held only once in a year (for both even and odd semesters) normally in the month of July after declaration of results of even semester examination of the incumbent session, or as decided by the University time to time.

12.3. Those students who would have backlogs in registered theory and/ or practical/ sessional subjects in the odd and or even semesters of any year will be allowed to appear in the supplementary examinations of the same year.

12.4. Those B.Tech. students who are allowed to appear the supplementary examination (of odd or even or both semester**),** may be provisionally admitted to attend the classes of the next higher odd semester of the next year. However, such provisionally admitted students will become regular only after passing in all their backlog papers in supplementary examination, if eligible otherwise.

12.5. If a student fails to clear in the supplementary examination all the backlogs of theory, practical/sessional subjects of the odd and even semesters, he/she will not be promoted to the odd semester of the next higher year, and such student shall be treated as ex-student.

12.6. Ex-students, (as per clause 12.5), shall be required to clear their backlog papers (theory and or practical/sessional subjects), in the end semester examination of the corresponding semesters (odd and even) and suplimentry examination to be conducted next year (in the following academic session). Such ex-students will be required to deposit the examination fees only.

12.7. If a student fails to appear in the practical/sessional examination of a semester due to unforeseen incident, a makeup end semester practical/sessional examination may be conducted,if required, strictly on the recommendation of the concerned Head of the Department, and approval of the Dean (Engineering & Technology).

13.0 BRANCH CHANGE AFTER FIRST YEAR RESULT

Students admitted in First Year B. Tech. course of the Institute of Technology having CPI of 08 or above at the end of their First Year course, are allowed to change their branch according to merit and subject to the seat availability in the branch where students want to shift. Only those students

will be considered for the branch change who would have cleared all the subjects of First and Second semesters in the first attempt itself in the End Semester Examination.

14.0 TRANSCRIPT
Transcript will be provided to the students as per the University norms.

15.0 INTERPRETATION
In case of any dispute in the matter of interpretation of this Ordinance, the decision of the Vice-Chanceller of the University shall be final and binding on the students.

16.0 POWER TO MODIFY
Not withstanding all that has been stated above, the Academic Council of the University has the right to propose any modifications or amendments to the Executive Council for final decision of the above regulations and further actions from time to time.

17.0 Matters not covered in this Ordinance shall be governed by the relevant ordinance of the University.

CODE OF CONDUCT FOR STUDENTS

CODE OF CONDUCT FOR STUDENTS

The students are admitted to Guru Ghasidas Vishwavidyalaya to achieve excellence and shape their character to become responsible citizens. They must realize their responsibility towards the Vishwavidyalaya and to its components like faculty, staff and fellow students. Failure to maintain a good standard of conduct shall result in disciplinary action.

Attendance: 75% attendance is compulsory in each subject.

Misconduct: Any of the following activities (but not limited to these only) will be treated as misconduct.

1. Disruption of teaching activities or disturbing the learning process of other students on the campus.

2. Any act on the part of the students, which disrupts functioning of the university, endangers health and safety of campus residents and da mages Vishwavidyalaya properties.

3. Cheating in examination and supplying of false documents / information in order to seek any consideration / favour from the University.

4. Possession or consumption of intoxicating beverages on the campus.

5. Failure to return back loaned material, settle University dues.

6. Possession of weapons.

7. Use of unparliamentarily language while in conversation with Vishwavidyalaya Staff and fellow students.

Disciplinary Actions:

Failure to adhere to good conduct may result in disciplinary actions like:

1. A warning by the authorities.

2. Suspension from a particular class.

3. Suspension / expulsion from the University.

4. Suspension of campus privileges e.g. hostel, accommodation etc.

5. Withholding of examination result or withdrawal of awarded diploma / degree certificate.

6. Any other disciplinary action deemed appropriate by the University authorities.

DISCIPLINE AMONG STUDENTS
IN
UNIVERSITY EXAMINATIONS

DISCIPLINE AMONG STUDENTS IN UNIVERSITY EXAMINATIONS

I UNIVERSITY END SEMESTER EXAMINATIONS

1. The end –semester examination shall be held under the general supervision of the Head of Department by the faculty member concerned. He/she shall be responsible for the fair and orderly conduct of the examination
2. In case of detection of unfair means (as specified in clause 1 of General Guidelines below), the same shall be brought to the notice of the head of the department concerned for further action specified under clause 5 of the General Guidelines below

II ENTRANCE EXAMINATIONS

1. During an entrance examination the candidates shall be under the disciplinary control of the chief Superintendent of the centre who shall issue the necessary instructions. If a candidate disobeys instructions or misbehaves with any member of the supervisory staff or with any of the invigilators at the centre, he/she may be expelled from the examination for that session.
2. The Chief Superintendent shall immediately report the facts of such a case with full details of evidence to the Controller of Examinations who will refer the matter to the Examination Discipline Committee in terms of clause 4 of General Guidelines below. The committee will make recommendations for disciplinary action as it may deem fit to the Vice-Chancellor as provided under clause 7
3. Everybody, before an examination begins, the invigilators shall call upon all the candidates to search their persons, tables, desks, etc. and ask them to hand over all papers, books, notes or other reference material which they are not allowed to have in their possession or accessible to them in the examination hall. Where a late-comer is admitted this warning shall be repeated to him at the time of entrance to the examination hall. They are also to see that each candidate has his/her identification card and hall ticket with him/her.

III GENERAL GUIDELINES

1. Use of Unfair means:
A candidate shall not use means in connection with any examination. The following shall be deemed to unfair means:
a. Found in possession of incriminating material related/unrelated to the subject of the examination concerned.
b. Found copying either from the possessed material or from a neighbor.
c. Inter-changing of answer scripts.
d. Change of seat for copying.

e. Trying to help others candidates.

f. Found consulting neighbours

g. Exchange of answer sheets or relevant materilas.

h. Writing some other candidate's register number in the main answer paper.

i. Insertion of pre-written answer sheets (Main sheets or Additional sheets)

j. Threatening the invigilator or insubordinate behavior as reported by the Chief Superintendent and / or Hall Superintendent.

k. Consulting the invigilator for answering the questions in the examination.

l. Cases of impersonation

m. Mass copying

n. Using electronic devices for the purpose of malpractice.

The Executive Council may declare any other act of omission or commission to be unfair means in respect of any or all the examination.

2. If the Vice-Chancellor is satisfied that there has been mass-scale copying or use or unfair means on a mass-scale at particular center(s), he may cancel the examination of all the candidates concerned and order re-examination.

3. Where the invigilator incharge is satisfied that one third (1/3) or more students were involved in using unfair-means or copying in a particular Examination Hall. It shall be deemed to be a case of mass copying.

a)   The Chief Superintendent of the examination centre shall report to the Controller of Examinations without delay and on the day of the occurrence if possible, each case where use of unfair means in the examination is suspected or discovered with full details of the evidence in support thereof and the statement of the candidate concerned, if any, on the forms supplied by the Controller of Examination for the purpose.

b)   A candidate shall not be forced to give a statement but the fact of his /her having refused to make a statement shall be recorded by the Chief Superintendent and shall be got attested by two other members of the supervisory staff on duty at the time of occurrence of the incident.

c)   A candidate detected or suspected of using unfair means in the examination may be permitted to answer the question paper, but on separate answer-book. The answer-book in which the use of unfair means is suspected shall be seized by the Chief Superintendent, who shall send both the answer-books to the Controller of Exami9nation with his report. This will not affect the concerned candidate appearing in the rest of the examinations.

d)   All cases of use of unfair means shall be reported immediately to the Controller of the Examination by the Centre Superintendent, examiner, paper-setter, evaluator, moderator, tabulator or the person connected with the University examination as the case may be, with all the relevant material.

4. Examination Discipline Committee

a) All the cases of alleged use of unfair means shall be referred to a committee called the Examination Discipline Committee to be appointed by the Vice-Chancellor.

b) The Committee shall consists of five members drawn from amongst the teachers and officers of the university. One member will be nominated as Chairman from amongstthem by the Vice Chancellor.

c) A member shall be appointed for a term of two years, and shall be eligible for re-appointment.

d) Three members present shall constitute the quorum.

e) Ordinarily, all decisions shall be taken by the Committee by simple majority. If the members cannot reach a consensus, the case shall be referred to the Vice-Chancellor, whose decision shall be final.

f) All decisions taken by the examination discipline committee will be placed before the Vice-Chancellor for approval

g) A candidate within one month of the receipt of the decision of the university may appeal to the Vice-Chancellor, in writing for a review of the case. If the Vice-Chancellor is satisfied that the representation merits consideration, he/she may refer the case back to the Examination Discipline Committee for reconsideration.

5 The Examination Discipline Committee may recommend one of the following punishments for cases of unfair means

Nature of unfair means	Scale of Punishment
If the candidate has used unfair means specified in sub-clause (a) to (g) of clause 3	Cancel all the University Examinations registered by the candidate in that session.
If the candidate has repeated the unfair means shown at 3(a) to (g) a second time	Cancel the University Examination of all subjects registered by the candidate in that session and debar him/her for the next examination session (i.e. all university Examinations in the subsequent session)
If the candidate has repeated the unfair means shown at 3(a) to (g) third time	Cancel the University Examination of all subjects registered by the candidate for that session and debar him/her for two years from registering and appearing for the university Examination
If the candidate has used unfair means	Cancel the University Examination of all subjects registered by the candidate during that semester only.

specified in sub-clause (h) of clause	
If the candidate has used unfair means specified in sub-clause (i) of clause	Cancel the University Examination of all subjects registered by the candidate for that session and debar him/her for two subsequent Examination sessions.
If the candidate has used unfair means specified in sub-clause (j) of clause 3	Cancel the University Examination of all subjects registered by the candidate for that session and debar him/her for two years from registering and appearing for the university Examination
If the candidate has used unfair means specified in sub-clause (k) of clause	Cancel the University Examination of all subjects registered by the candidate for that session
If the candidate has used unfair means specified in sub-clause (l) of clause	Cancel the University Examination of all subjects registered by the candidate for that session and debar him/her for two years from registering and appearing for the examination sessions. Moreover, relevant legal action shall be initiated if an outsider is involved.
If the candidate used unfair means in sub-clause (m) of clause 3	ix) a) In the single Hall: Cancel the relevant examination taken by the students of that Hall. Debar the concerned Hall superintendent and other involved directly or indirectly from the examination work such as invigilation, question paper-setting, valuation, etc. for the next six examination sessions. b) In a Centre: Cancel the relevant examination taken by the students of the center. Debare the Hall Superintendents and the Chief Superintendent and other involved directly or indirectly from the examination work such as invigilation, question paper-setting, valuation, etc. for the next six examination sessions and cancel the examination center for two years

Regulation for the Disposal of cases of "Use or attempt to use Unfair Means" and Disorderly conduct at an examination by a candidate. {Statue 14(d), Draft Ordinance 26(36)}

1. A candidate shall not use unfair means or behave disorderly in any manner, in connection with any examinations of the University.

2. In every case (Except cases of Internal/Practical examinations) where a candidate appearing for an examination is found using or attempting to use unfair means at the examination or behaving in a disorderly manner, a report accompanied with the candidate's answer books and such documents and articles as were found in his possession and as constitute primafacie evidence of the use of unfair means/disorderly behavior shall be sent immediately to the Controller of Examinations. Provided that in case of Internal/Practical examinations, if any kind of unfair means detected during such examinations, the same shall be brought to the notice of the Head of the Department concerned, who shall submit a full report of the same to the Dean concerned and the Dean concerned shall have full power to decide the case in consultation with Head of the Department concerned at School of Studies / Departmental level only. If an examinee disobeys instructions or misbehaves with any member of the supervisory staff or with any of the invigilators during the examinations, he/she may be expelled by the Dean/HoD from that session of the examination.

3. The Chief Superintendent/Superintendent of the examination centre shall report to the Controller of Examinations without delay and on the day of the occurrence if possible, each case where use of unfair means in the examination conduct ed by the Univer sit y is suspected or discovered with full details of the evidence in support thereof and the statement of the candidate concerned, if any, on the forms supplied by the University for the purpose.

4. A candidate shall not be forced to give a statement but the fact of his/ her having refused to make a statement shall be recorded by the Chief Superintendent/ Superintendent and shall be got attested by two other members of the supervisory staff on duty at the time of occurrence of the incident.

5. A candidate detected or suspected of using unfair means in the examination conducted by the University may be permitted to answer the question paper, but on separate answer-book. The answer-book in which the use of unfair means is suspected shall be seized by the Chief Superintendent/ superintendent, who shall send both the answer- books to the Controller of Examinations with his report. This will be not affecting the concerned candidate appearing in the rest of the examinations

6. All cases of use of unfair means(Except cases of Internal/Practical examinations) during the examinations conducted by the University, shall be reported immediately to the

Controller of Examinations by the Centre Superintendent/ Superintendent, examiner, paper-setter, evaluator, moderator, tabulator or any other person connected with the University examination as the case may be, with all the relevant material.

7. If the Vice-Chancellor is satisfied that there has been mass-scale copying or use of unfair means on a mass-scale at particular center(s)/Building/Hall, he or she may cancel the examination of all the candidates concerned and order re-examination.

8. Where the invigilator in charge is satisfied that one third (1/3) or more students were involved in using unfair-means or copying in a particular Examination Hall, it shall be deemed to be a case of mass copying.

9. UNFAIR MEANS COMMITTEE

a) All the cases of alleged use of unfair means shall be referred to a Committee called the Unfair Means Committee to be appointed by the Vice-Chancellor as prescribed in Ordinance 26(36).

b) Ordinarily, all decisions shall be taken by the Committee by simple majority. If the members cannot reach a consensus, the case shall be referred to the Vice-Chancellor, whose decision shall be final.

c) All decisions taken by the Unfair Means Committee will be placed before the Vice-Chancellor for approval.

d) A candidate, within 10 days of the receipt of the decision of the University, may appeal to the Vice-Chancellor, in writing for a review of his/her case. If the Vice-Chancellor is satisfied that the representation merits consideration, he/she may either decide himself/herself the case finally or may refer the case back to the Unfair Means Committee for reconsideration of the same within next 10 days.

10. The Unfair Means Committee may recommend one of the following punishments for below mentioned cases of unfair means.

	Nature of unfair means	Scale of Punishment
(I)	Found in possession of incriminating material (Like book(s), notes, papers, electronic gadgets or any other like material, in any form.	
(A)	Recovered material not related to the subject or found writing something on the question paper, which is not the answer to the questions being asked on his question paper.	No punishment be imposed on the basis of examiner's report showing irrelevancy of material but a warning be issued for not to repeat the same.
(B)	The Material is relevant to the subject but not used.	Paper be cancelled, examinee be permitted to appear in ATKT / Supp. Exams., if eligible for the same.
(C)	The Material is relevant to the subject and used.	Concerned semester Examination and subsequent semester examination (if any) of the same session be cancelled, examinee be permitted to appear in the next full examination of concerned semester with all subject in next session.
(D)	The Material is relevant to the subject or paper (used/ not used) and the examinee showed indecent Behavior. **OR** The Material is relevant to the subject or paper and used and the examinee was again found using unfair means subsequently.	Concerned semester Examination and subsequent semester examination (if any) of the same session be cancelled and the examinee be debarred from appearing at all the semester examinations of next full session.
(E)	The Material is relevant to the subject or paper, used and the examinee showed gross indiscipline such as abusing / threatening the invigilators **OR** using abusive/derogatory language orally or in writing in the Answer Sheet against the Centre Superintendent / Examiner / Invigilator **OR** threatening / using violence towards Centre Superintendent or other persons connected with the conduct of the examinations **OR** any other form of gross insubordinate behavior as reported by the Chief Superintendent and / or Hall Superintendent **OR** found using unfair means in the two or more subsequent papers, found destroying evidence or not depositing the examination answer books .	Concerned semester Examination and subsequent semester examination (if any) of the same session be cancelled and the examinee be debarred from appearing at all the semester examinations of next two full session.

(II)	If an examinee / candidate is found carrying a weapon capable of inflicting injury in the examination rooms / halls. (Note-The Chief Superintendent and / or Centre Superintendent / Hall Superintendent in such a case should ask for seizure of the weapon and report the matter to the concern police station)	Concerned semester Examination and subsequent semester examination (if any) of the same session be cancelled and the examinee be debarred from appearing at all the semester examinations of next three full session.
(III)	If a report is received that an examinee has physically assaulted any person connected with the University Examinations.	Concerned semester Examination and subsequent semester examination (if any) of the same session be cancelled and the examinee be debarred from appearing at all the semester examinations of next four full session.
(IV) (a)	Found receiving or giving assistance in copying from or to other examinees during the course of the examination. **OR** Trying to help other candidates. **OR** Found consulting neighbors for the purpose of copying **OR** Writing questions and answers on any additional paper other than the Answer Sheet.	Paper be cancelled, examinee be permitted to appear in ATKT/ Supp. Exams., if eligible for the same.
(b)	Inter-changing of answer scripts or other relevant material. **OR** Change of seat for copying including found sitting in a room or at a seat other than the allotted one without permission of the Centre Superintendent. **OR** Writing some other candidate's register number, intentionally, in the answer sheet.	Concerned semester Examination and subsequent semester examination (if any) of the same session be cancelled.
(c)	If the candidate has repeated the unfair means shown at clause **IV (b)** above a **second time.**	Concerned semester Examination and subsequent semester examination (if any) of the same session be cancelled and the examinee be debarred from appearing at all the semester examinations of next full session.
(d)	Insertion of pre- written answer sheets (Main sheets or Additional Sheets) including smuggling in or out of the examination hall of Answer Sheet in whole or part or tampering with it in any way. **OR** Replacement of Answer Sheet, exchange of Answer Sheet with other student, addition of extra pages in the Answer Sheet, smuggling of Answer Sheet/pages. **OR** Candidate is	Concerned semester Examination and subsequent semester examination (if any) of the same session be cancelled and the examinee be debarred from appearing at all the semester examinations of next full session.

	caught with a material which he has chewed or swallowed or torn into pieces and the candidate refuses to sign the documents and also misbehave with the invigilation staff.	
(e)	Consulting the invigilator for answering the questions in the examination or communicating with the examiner or any other person connected with the examination for favor.	Cancel the Examination of that Paper for which the examinee was found consulting the invigilator or Cancel the Examinations of all subjects/Papers registered by the candidate for concerned semester for which he was found communicating with the examiner /examiners or any other person connected with the examination for favor.
(f)	Cases of impersonation i.e. sending some other person to take the examination.	Cancel the University Examinations of all subjects registered by the candidate for concerned semester and subsequent semesters (if any) of the same session and debar him/her from all semester examinations for immediate next session. **Moreover, relevant legal action shall be initiated if an outsider is involved.**
(V)	**Cases not covered under any of the above clauses.**	The Committee may recommend appropriate action/decision in each case.
(VI)	**Mass copying: -**	
a)	In the Single Building /Hall/Room: –	Cancel the relevant examination taken by the students of that Building /Hall/Room. Debar the concerned Building /Hall Superintendent and other involved directly or indirectly from the examination work such as invigilation, question paper setting, valuation, etc. for the next six sessions (Three Years) of semester examinations.
b)	In a Centre/Building:	Cancel the relevant examination taken by the students of the Centre/Building. Debar the Superintendents and the Chief Superintendent and other involved directly or indirectly from the examination work such as invigilation, question paper setting, valuation etc. for the next six examination sessions (Three Years) **and cancel the examination center for two years.**

(VII) Unfair Means cases in Internal/Sessional and Practical Examinations -:

If any kind of unfair means detected during the **Internal/Sessional** and /or Practical Examinations the same shall be brought to the notice of the Head of the Department concerned, who shall submit a full report to the Dean, School of Studies concerned. The

Dean concerned, in consultation with the Head of Department, shall have full power to decide the case at School of Study / Departmental level only.

The maximum penalty for using unfair means in Internal/Sessional and Practical Examinations shall be as follows :-

If the examinee found using any kind of the unfair means during any **Internal/Sessional** or **Practical examination**, the Dean in consultation with Head of the Department and on the basis of the report of the Head of the Department concerned, the Dean or Under the Order/Instruction of the Dean concerned, the Head of the Department **shall expel the examinee from the Internal/Sessional or Practical Examination.**

If an examinee disobeys instructions or misbehaves with any member of the supervisory staff or with any of the invigilators during such examinations, he/she may be expelled by the Dean/HoD from that session of the examination.

If the examinee repeated the use of unfair means second time in any subsequent **Internal/Sessional** Examination or **Practical Examination,** the Dean concerned, in consultation with Head of the Department, shall cancel the admission of the examinee in the concerned Department for that session for which he was found using unfair means second time.

Appeal: - A candidate, **within 10 days of the receipt of the decision of the Dean/Head of the Department,** may appeal to the Vice-Chancellor, in writing for a review of his/her case. If the Vice-Chancellor is satisfied that the representation merits consideration, he/she may either decide himself/herself the case finally or may refer the case back to the Dean/Head of the Department , as the case may be, for reconsideration **of the same within next 10 days.**

11. INTERPRETATION OF REGULATION

In any matter of interpretation of the provisions of this regulation, the matter shall be referred to Vice-Chancellor who in the capacity of the chairman of Academic Council and Executive Council shall decide the concerned matter finally.

12. POWER TO REMOVE DIFFICULTIES

If any question arises related to the matters not covered in these provisions, the relevant provisions made in appropriate Act / Statute / Ordinance / Regulations / Rules / Notifications issued by the university shall prevail. In addition to above the Executive Council, on the recommendations of Academic Council, may declare any other act of omission or commission to be unfair means in respect of any or all the examination.

ABOUT ANTI RAGGING

ABOUT ANTI RAGGING

UGC DRAFT REGULATIONS ON CURBING THE MENACE OF RAGGING IN
HIGHER EDUCATIONAL INSTITUTIONS, 2009

In exercise of the power conferred by Clause (g) of Sub-Section (1) of Section 26 of the University Grants Commission Act, 1956, the University Grants Commission hereby makes the following Regulations, namely-

1. Title, commencement and applicability:-

1.1. These regulations shall be called the "UGC Regulations on Curbing the Menace of Ragging in Higher Educational Institutions, 2009".

1.2. They shall come into force with immediate effect.

1.3. They shall apply to all the universities established or incorporated by or under a Central Act, a Provincial Act or a State Act, to all institutions deemed to be university under Section 3 of the UGC Act, 1956, to all other higher educational institutions, including the departments, constituent units and hall the premises (academic, residential, sports, canteen, etc) of such universities, deemed universities and other higher educational institutions, whether located within the campus or outside, and to all means of transportation of students whether public or private.

2. Objective:-

To root out ragging in all its forms from universities, colleges and other educational institutions in the country by prohibiting it by law, preventing its occurrence by following the provisions of these Regulations and punishing those who indulge in ragging in spite of prohibition and prevention as provided for in these Regulations and the appropriate law in force.

3. Definitions:-

For the purposes of these Regulations:-

3.1 "college" means any institution, whether known as such or by any other name, which provides for a programme of study beyond 12 years of schooling for obtaining any qualifi cation from a university and which, in accordance with the rules and regulations of such university, is recognized as competent to provide for such programmes of study and present students undergoing such programmes of study for the examination for the award of such qualifi cation.

3.2 "Head of the institution" means the 'Vice-Chancellor' in case of a university/deemed to be university, 'Principal' in case of a college, 'Director' in case of an institute.

3.3 "institution" means a higher educational institution (HEI), like a university, a college, an institute, etc. imparting higher education beyond 12 years of schooling leading to a degree (graduate, postgraduate and/or higher level).

3.4 Ragging" means the following: Any disorderly conduct whether by words spoken or written or by an act which has the effect of teasing, treating or handling with rudeness any other student, indulging in rowdy or undisciplined activities which causes or is likely to cause annoyance, hardship or psychological harm or to raise fear or apprehension thereof in a fresher or a junior student or asking the students to do any act or perform something which such student will not in the ordinary course and which has the effect of causing or generating a sense of shame or embarrassment so as to adversely affect the physique or psyche of a fresher or a junior student.

3.5 "University" means a university established or incorporated by or under a Central Act, a Provincial Act or a State Act, an institution deemed to be university under Section 3 of the UGC Act, 1956, or an institution specially empowered by an Act of Parliament to confer or grant degrees

4 Punishable ingredients of Ragging:-

• Abetment to ragging;

• Criminal conspiracy to rag;

• Unlawful assembly and rioting while ragging;

• Public nuisance created during ragging;

• Violation of decency and morals through ragging;

• Injury to body, causing hurt or grievous hurt;

• Wrongful restraint;

• Wrongful confinement;

• Use of criminal force;

• Assault as well as sexual offences or even unnatural offences;

• Extortion;

• Criminal trespass;

• Offences against property;

• Criminal intimidation;

• Attempts to commit any or all of the above mentioned offences against the victim(s);

• All other offences following from the defi nition of "Ragging".

5 Measures for prohibition of ragging at the institution level:-

5.1 The institution shall strictly observe the provisions of the Act of the Central Government and the State Governments, if any, or if enacted, considering ragging as a cognizable offence under the law on a par with rape and other atrocities against women and ill- treatment of persons belonging to the SC/ST, and prohibiting ragging in all its forms in all institutions.

5.2 Ragging in all its forms shall be totally banned in the entire institution, including its departments, constituent units, all its premises (academic, residential, sports, canteen, etc) whether located within the campus or outside and in all means of transportation of students whether public or private.

5.3 The institution shall take strict action against those found guilty of ragging and/or of abetting ragging.

6 Measures for prevention of ragging at the institution level:-

6.1 Before admissions:-

6.1.1 The advertisement for admissions shall clearly mention that ragging is totally banned in the institution, and anyone found guilty of ragging and/or abetting ragging is liable to be punished Appropriately (for punishments, ref. section 8 below).

6.1.2 The brochure of admission/instruction booklet for candidates shall print in block letters these Regulations in full (including Annexures).

6.1.3 The 'Prospectus' and other admission related documents shall incorporate all directions of the Supreme Court and / or the Central or State Governments as applicable, so that the candidates and their parents/ guardians are sensitized in respect of the prohibition and consequences of ragging. If the institution is an affi liating university, it shall make it mandatory for the institutions under it to compulsorily incorporate such information in their 'Prospectus'.

6.1.4 The application form for admission/ enrolment shall have a printed undertaking, preferably both in English/Hindi and in one of the regional languages known to the institution and the applicant (English version given in Annexure I, Part I), to be filled up and signed by the candidate to the effect that he/she is aware of the law regarding prohibition of ragging as well as the punishments, and that he/she, if found guilty of the offence of ragging and/or abetting ragging, is liable to be punished appropriately.

6.1.5 The application form shall also contain printed undertaking, preferably both in English/Hindi and in one of the regional languages known to the institution and the parent/ guardian (English version given in Annexure I, Part II), to be signed by the parent/ guardian of the applicant to the effect that he/ she is also aware of the law in this regard and agrees to abide by the punishment meted out to his/her ward in case the latter is found guilty of ragging and/or abetting ragging.

6.1.6 The application for admission shall be accompanied by a document in respect of the School Leaving Certificate/ Character Certificate which shall include a report on the behavioral pattern of the applicant, so that the institution can thereafter keep intense watch upon a student who has a negative entry in this regard.

6.1.7 A student seeking admission to the hostel shall have to submit another undertaking in the form of Annexure I (both Parts) along with his/ her application for hostel accommodation.

6.1.8 At the commencement of the academic session the Head of the Institution shall convene and address a meeting of various functionaries/agencies, like Wardens, representatives of students, parents/ guardians, faculty, district administration including police, to discuss the measures to be taken to prevent ragging in the Institution and steps to be taken to identify the offenders and punish them suitably.

6.1.9 To make the community at large and the students in particular aware of the dehumanizing effect of ragging, and the approach of the institution towards those indulging in ragging, big posters (preferably multicolored with different colours for the provisions of law, punishments, etc.) shall be prominently displayed on all Notice Boards of all departments, hostels and other buildings as well as at vulnerable places. Some of such posters shall be of permanent nature in certain vulnerable places.

6.1.10 The institution shall request the media to give adequate publicity to the law prohibiting ragging and the negative aspects of ragging and the institution's resolve to ban ragging and punish those found guilty without fear or favour.

6.1.11 The institution shall identify, properly illuminate and man all vulnerable locations.

6.1.12 The institution shall tighten security in its premises, especially at the vulnerable places. If necessary, intense policing shall be resorted to at such points at odd hours during the early monthsof the academic session.

6.1.13 The institution shall utilize the vacation period before the start of the new academic year to launch wide publicity campaign against ragging through posters, leafl ets. seminars, street plays, etc.

6.1.14 The faculties/ departments/ units of the institution shall have induction arrangements (including those which anticipate, identify and plan to meet any special needs of any specific section of students) in place well in advance of the beginning of the academic year with a clear sense of the main aims and objectives of the induction process.

6.2 On admission:-

6.2.1Every fresher admitted to the institution shall be given a printed leafl et detailing when and to whom he/she has to turn to for help and guidance for various purposes (including Wardens, Head of the institution, members of the anti-ragging committees, relevant district and police authorities), addresses and telephone numbers of such persons/ authorities, etc., so that the fresher need not look up to the seniors for help in such matters and get indebted to them and

start doing things, right or wrong, at their be hest. Such a step will reduce the fresher's dependence on their seniors .

6.2.2 The institution through the leaflet mentioned above shall explain to the new entrants the arrangements for their induction and orientation which promote efficient and effective means of integrating them fully as students.

6.2.3 The leaflet mentioned above shall also tell the fresher's about their rights as bonafide students of the institution and clearly instructing them that they should desist from doing anything against their will even if ordered by the seniors, and that they have nothing to fear as the institution cares for them and shall not tolerate any atrocities against them.

6.2.4 The leaflet mentioned above shall contain a calendar of events and activities laid down by the institution to facilitate and complement familiarization of juniors with the academic environment of the institution.

6.2.5 The institution shall also organize joint sensitization programmes of 'freshers' and seniors.

6.2.6 Fresher shall be encouraged to report incidents of ragging, either as victims, or even as witnesses.

6.3 At the end of the academic year:-

6.3.1 At the end of every academic year the Vice-Chancellor/ Dean of Students Welfare/ Director/ Principal shall send a letter to the parents/ guardians who are completing the first year informing them about the law regarding ragging and the punishments, and appealing to them to impress upon their wards to desist from indulging in ragging when they come back at the beginning of the next academic session.

6.3.2 At the end of every academic year the institution shall form a 'Mentoring Cell' consisting of Mentors for the succeeding academic year. There shall be as many levels or tiers of Mentors as the number of batches in the institution, at the rate of 1 Mentor for 10 freshers and 1 Mentor of a higher level for 10 Mentors of the lower level.

6.4 Setting up of Committees and their functions:-

6.4.1The Anti-Ragging Committee:- The Anti-Ragging Committee shall be headed by the Head of the institution and shall consist of representatives of faculty members, parents, students belonging to the freshers' category as well as seniors and non-teaching staff. It shall consider the recommendations of the Anti-Ragging Squad and take appropriate decisions, including spelling out suitable punishments to those found guilty.

6.4.2 The Anti-Ragging Squad:- The Anti-Ragging Squad shall be nominated by the Head of the institution with such representation as considered necessary and shall consist of members belonging to the various sections of the campus community. The Squad will have vigil, oversight and patrolling functions. It shall be kept mobile, alert and active at all times and shall be empowered to inspect places of potential ragging and make surprise raids on hostels and other

hot spots. The Squad shall investigate incidentsof ragging and make recommendations to the Anti-Ragging Committee and shall work under the overall guidance of the said Committee.

6.4.3 Monitoring Cell on Ragging:- If the institution is an affi liating university, it shall have aMonitoring Cell on Ragging to coordinate with the institutions affi liated to it by calling for reports from the Heads of such institutions regarding the activities of the Anti-Ragging Committees, Squads, and Mentoring Cells, regarding compliance with the instructions on conducting orientation programmes, counseling sessions, etc., and regarding the incidents of ragging, the problems faced by wardens and other offi cials, etc. This Cell shall also review the efforts made by such institutions topublicize anti-ragging measures, cross-verify the receipt of undertakings from candidates/students and their parents/guardians every year, and shall be the prime mover for initiating action by the university authorities to suitably amendthe Statutes or Ordinances or Bye-laws to facilitate the implementation of anti ragging measures at the level ofthe institution.

6.5 Other measures:-

6.5.1   The Annexure mentioned in 6.1.4, 6.1.5 and 6.1.7 shall be furnished at the beginning of each academic year by every student, that is, by freshers as well as seniors.

6.5.2   The institution shall arrange for regular and periodic psychological counseling and orientation for students (for freshers separately, as well as jointly with seniors) by professional counselors during the first three months of the new academic year. This shall be done at the institution and department/ course levels. Parents and teachers shall also be involved in such sessions.

6.5.3   Apart from placing posters mentioned in 6.1.9 above at strategic places, the institution shall undertake measures for extensive publicity against ragging by means of audio-visual aids, by holding counseling sessions, workshops,painting and design competitions among students and other methods as it deems fit.

6.5.4 If the institution has B.Ed. and other Teacher training programmes, these courses shall be mandated to provide for anti-ragging and the relevant human rights appreciation inputs, as well as topics on sensitization against corporal punishments and checking of bullying amongst students, so that every teacher is equipped to handle at least the rudiments of the counseling approach.

6.5.5 Wardens shall be appointed as per the eligibility criteria laid down for the post refl ecting both the command and control aspects of maintaining discipline, as well as the softer skills of counseling and communicating with the youth outside the class-room situations. Wardens shall be accessible at all hours and shall be provided with mobile phones. The institution shall review and suitably enhance the powers and perquisites of Wardens and authorities involved in curbing the menace of ragging.

6.5.6   The security personnel posted in hostels shall be under the direct control of the Wardens and assessed by them.

6.5.7   Private commercially managed lodges and hostels shall be registered with the local police authorities, and this shall be done necessarily on the recommendation of the Head of the institution. Local police, local administration and the institutional authorities shall ensure vigil on incidents that may come within the definition of ragging and shall be responsible for action in the event of ragging in such premises, just as they would be for incidents within the campus. Managements of such private hostels shall be responsible for not reporting cases of ragging in their premises.

6.5.8   The Head of the institution shall take immediate action on receipt of the recommendations of the Anti-Ragging Squad. He/ She shall also take action suo motto if the circumstances so warrant.

6.5.9   Freshers who do not report the incidents of ragging either as victims or as witnesses shall also be punished suitably.

6.5.10 Anonymous random surveys shall be conducted across the 1st year batch of students (freshers) every fortnight during the first three months of the academic year to verify and cross-check whether the campus is indeed free of ragging or not. The institution may design its own methodology of conducting such surveys.

6.5.11 The burden of proof shall lie on the perpetrator of ragging and not on the victim.

6.5.12 The institution shall fi le an FIR with the police / local authorities whenever a case of ragging is reported, but continue with its own enquiry and other measures without waiting for action on the part of the police/ local civil authorities. Remedial action shall be initiated and completed within the one week of the incident itself.

6.5.13 The Migration / Transfer Certificate issued to the student by the institution shall have an entry, apart from those relating to general conduct and behaviour, whether the student has been punished for the offence of committing or abetting ragging, or not, as also whether the student has displayed persistent violent or aggressive behaviour or any desire to harm others.

6.5.14 Preventing or acting against ragging shall be the collective responsibility of all levels and sections of authorities or functionaries in the institution, including faculty, and not merely that of the specifi c body/ committee constituted for prevention of ragging.

6.5.15 The Heads of institutions other than universities shall submit weekly reports to the Vice-chancellor of the university the institution is affiliated to or recognized by, during the first three months of new academic year and thereafter each month on the status of compliance with anti-ragging measures. The Vice Chancellor of each university shall submit fortnightly reports of the university, including those of the Monitoring Cell on Ragging in case of an affiliating university, to the Chancellor.

6.5.16 Access to mobile phones and public phones shall be unrestricted in hostels and campuses, except in class-rooms, seminar halls, library etc. where jammers shall be installed to restrict the use of mobile phones.

6.6 Measures for encouraging healthy interaction between freshers and seniors:-

6.6.1 The institution shall set up appropriate committees including the course-in-charge, student advisor, Warden and some senior students to actively monitor, promote and regulate healthy interaction between the freshers and senior students.

6.6.2 Freshers' welcome parties shall be organized in each department by the senior students and the faculty together soon after admissions, preferably within the fi rst two weeks of the beginning of the academic session, for proper introduction to one another and where the talents of the freshers are brought out properly in the presence of the faculty, thus helping them to shed their inferiority complex, if any, and remove their inhibitions.

6.6.3　The institution shall enhance the student-faculty interaction by involving the students in all matters of the institution, except those relating to the actual processes of evaluation and of faculty appointments, so that the students shall feel that they are responsible partners in managing the affairs of the institution and consequently the credit due to the institution for good work/ performance is due to them as well.

6.7 Measures at the UGC/ Statutory/ Regulatory bodies' level:-

6.7.1 The UGC and other Statutory /Regulatory bodies shall make it mandatory for the institutions to compulsorily incorporate in their 'Prospectus' the directions of the Supreme Court and/or the Central or State Governments with regard to prohibition and consequences of ragging, and that noncompliance with the directives against ragging in any manner whatsoever shall be considered as lowering of academic standards by the erring institution making it liable for appropriate action.

6.7.2 The UGC (including NAAC and UGC Expert Committees visiting institutions for various purposes) and similar Committees of other Statutory/Regulatory bodies shall cross-verify that the institutions strictly comply with the requirement of getting the undertakings from the students and their parents/ guardians as envisaged under these Regulations.

6.7.3 The UGC and other funding bodies shall make it one of the conditions in the Utilization Certificate for sanctioning any financial assistance or aid to the institution under any of the general or special schemes that the institution has strictly complied with the anti-ragging measures and has a blemishless record in terms of there being no incidents of ragging during the period pertaining to the Utilization Certificate.

6.7.4 The NAAC and other accrediting bodies shall factor in any incident ofragging in the institution while assessing the institution in different grades.

6.7.5 The UGC shall constitute a Board for Coordination consisting of representatives of the AICTE, the IITs, the NITs, the IIMs, the MCI, the DCI, the NCI, the ICAR and such other bodies which have to deal with higher education to coordinate and monitor the anti-ragging movement across the country and to make certain policy decisions. The said Board shall meet once in a year in the normal course.

6.7.6   The UGC shall have an Anti-Ragging Cell within the Commission as an institutional mechanism to provide secretarial support for collection of information and monitoring, and to coordinate with the State level and university level Committees for effective implementation of anti-ragging measures.

6.7.7 If an institution fails to curb ragging, the UGC/ the Statutory/ Regulatory body concerned may stop financial assistance to such an institution or take such action within its powers as it may deem fi t and impose such other penalties as provided till such time as the institution achieves the objective of curbing ragging.

7   Incentives for curbing ragging:-

7.1   The UGC shall consider providing special/ additional annual financial grants-inaid to those eligible institutions which report a blemish-less record in terms of there being no incidents of ragging.

7.2   The UGC shall also consider instituting another category of fi nancial awards or incentives for those eligible institutions which take stringent action against those responsible for incidents of ragging.

7.3   The UGC shall lay down the necessary incentive for the post of Warden in order to attract the right type of eligible candidates, and motivate the incumbent.

8 Punishments:-

8.1At the institution level:

Depending upon the nature and gravity of the offence as established by the Anti-Ragging Committee of the institution, the possible punishments for those found guilty of ragging at the institution level shall be any one or any combination of the following:

8.1.1   Cancellation of admission

8.1.2   Suspension from attending classes

8.1.3   Withholding/ withdrawing scholarship/ fellowship and other benefi ts

8.1.4   Debarring from appearing in any test/ examination or other evaluation process

8.1.5   Withholding results

8.1.6   Debarring from representing the institution in any regional, national or international meet, tournament, youth festival, etc.

8.1.7   Suspension/ expulsion from the hostel

8.1.8   Rustication from the institution for period ranging from 1 to 4 semesters

8.1.9   Expulsion from the institution and consequent debarring from admission to any other institution

8.1.10 Fine of Rupees 25,000/-

8.1.11 Collective punishment: When the persons committing or abetting the crime of ragging are not identifi ed, the institution shall resort to collective punishment as a deterrent to ensure community pressure on the potential raggers.

8.2 At the university level in respect of institutions under it:

If an institution under a university (being constituent of, affi liated to or recognized by it) fails to comply with any of the provisions of these Regulations and fails to curb ragging effectively, the university may impose any or all of the following penalties on it:

8.2.1 Withdrawal of affi liation/ recognition or other privileges conferred on it

8.2.2 Prohibiting such institution from presenting any students then undergoing any

programme of study therein for the award of any degree/diploma of the university

8.2.3 Withholding any grants allocated to it by the university

8.2.4 Any other appropriate penalty within the powers of the university.

8.3 At the UGC level:

If an institution fails to curb ragging, the UGC may impose any or all of the following penalties on it:

8.3.1 Delisting the institution from section 2(f) and /or section 12B of the UGC Act

8.3.2 Withholding any grants allocated to it

8.3.3 Declaring institutions which are not covered under section 2(f) and or 12B as ineligible

for any assistance like that for Major/ Minor Research Project, etc.

8.3.4 Declaring the institution ineligible for consideration under any of the special assistance

programmes like CPE (College with potential for Excellence), UPE (University with Potential

for Excellence) CPEPA (Centre with Potential for Excellence in a Particular Area), etc.

8.3.5 Declaring that the institution does not have the minimum academic standards and

warning the potential candidates for admission accordingly through public notice and

posting on the UGC Website.

TELEPHONE DIRECTORY

Important Contacts:

S.No.	POSITION	NAME	PHONE NO. (07752)
01.	Vice Chancellor	Prof. Alok Chakrawal	260283, 260353
02.	Registrar	Prof. Shailendra Kumar	260209
03.	Dean, Student and Welfare	Dr. Madhvendra Nath Tripathi	260204
4.	Dean, SoS(Engg. & Tech.)	Dr. T.V.ARJUNAN	09894332446
5.	HOD (Computer Science and Engineering)	Dr. Alok Kumar Singh Kushwaha	8090631394
6.	HOD (Industrial & Production Engineering)	Prof. Sharad Chandra Srivastava	09431382634
7.	HOD (Chemical Engineering)	Dr. Anil Kumar Chandrakar	9300105586
8.	HOD (Mechanical Engineering)	Dr. T.V.ARJUNAN	9894332446
9.	HOD (Civil Engineering)	Dr. M. Chakradhara Rao	09039522447
10	HOD (Information Technology)	Dr. Rohit Raja	7000559696
11	HOD (Electronics & Comm. Engineering)	Mrs. Anita Khanna	9425280114

Department Contacts:

Name	Designation	Phone Number	E-Mail id
Dr. Alok Kumar Singh Kushwaha	Associte Professor & Head	8090631394	alokkumarsingh.jk@gmail.com
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Mr. Devendra Kumar Singh	Assistant Professor	98274741404	devendra.singh170@gmail.com
Mr. Nishant Behar	Assistant Professor & Head	07757-260456 9827179525	nishant.itggv@gmail.com
Mr. Vaibhav kant Singh	Assistant Professor	9424174443	vibhu200427@gmail.com
Mrs. Nishi Yadav	Assistant Professor	8103371508	nishidv@gmail.com
Ms. Raksha Sharma	Assistant Professor	9893129840	rakshasharma10@gmail.com
Mr. Amit Baghel	Assistant Professor	9826339264	amit_kumar_baghel@rediffmail.com
Mr. Satish Kumar Negi	Assistant Professor	9575111882	skn.ggv@gmail.com
Mr. Pushpendra kumar Chandra	Assistant Professor	9098505754	pushpendrachandra@gmail.com
Mr. Manjit Jaiswal	Assistant Professor	9685713546	manjit.jaiswal222@gmail.com
Dr. Princy Matlani	Assistant Professor	9630483831	princy.matlani@gmail.com

Staff Contacts:

Mr.Shiv Kumar Koushik	Technical Assistant	9977018188
Mr.B.S.Kshatri	Lab Attendant	9755508501
Mr.Praveen Kaser	Junior Office Assistant	7898752254
Mr.Chandan Nanet	Peon	8817696941

COURSE STRUCTURE AND SYLLABUS

(AICTE-COURSE)

CBCS

SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA (A CENTRAL UNIVERSITY)
CBCS-NEW, STUDY & EVALUATION SCHEME
PROPOSED W.E.F. SESSION 2020-2021
B.Tech. I Year (SEMESTER I)
(Common for CSE, ECE and IT)

SN	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	SUB-TOTAL	
1.	MA201TBS01	MATHEMATICS-I	3	1	-	30	70	100	4
2.	PH201TBS02	PHYSICS	3	1	-	30	70	100	4
3.	EC201TES01	BASIC ELECTRICAL & ELECTRONICS ENGINEERING	3	1	-	30	70	100	4
4.	IT201TES02	INTRODUCTION TO INFORMATION TECHNOLOGIES	2	0	0	30	70	100	2
5.	EN201THS01	ENGLISH COMMUNICATION	3	0	-	30	70	100	3
		Total	14	3	0	150	350	500	17
		PRACTICALS							
1.	PH201PBS01	PHYSICS LAB	-	-	2	30	20	50	1
2.	ME201PES01	ENGINEERING GRAPHICS	1	-	3	30	20	50	3
3.	ME201PES02	WORKSHOP TECHNOLOGY & PRACTICES	1	-	2	30	20	50	1
4.	EC201PES03	BASIC ELECTRICAL ENGINEERING LAB	-	-	2	30	20	50	1
		Total	2	-	9	120	80	200	7
	GRAND TOTAL		16	3	9	270	430	700	24

Total Credits   :   24
Total Contact Hour   :   28
Total Marks   :   700

*INTERNAL ASSESSMENT- Two Class Test of 15 Marks each will be conducted.
L-LECTURE, T-TUTORIAL, P-PRACTICAL, ESE –END SEMESTER EXAMINATION

SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA (A CENTRAL UNIVERSITY)
CBCS-NEW, STUDY & EVALUATION SCHEME
PROPOSED W.E.F. SESSION 2020-2021
B.Tech. I Year (SEMESTER II)
(Common for CSE, ECE and IT)

SN	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	SUB-TOTAL	
1.	MA202TBS03	MATHEMATICS-II	3	1	-	30	70	100	4
2.	CY202TBS04	CHEMISTRY	3	1	-	30	70	100	4
3.	CE202TES03	ENGINEERING MECHANICS	3	1	-	30	70	100	4
4.	CS202TES04	COMPUTER PROGRAMMING	3	0	-	30	70	100	3
5.	CM202TES05	BASIC CIVIL & MECHANICAL ENGINEERING	3	0	0	30	70	100	3
6.	LW202TMC01	INDIAN CONSTITUTION	2	0	0	-	-	-	-
		Total	17	3	0	150	350	500	18
		PRACTICALS							
1.	CY202PBS02	CHEMISTRY LAB	-	-	2	30	20	50	1
2.	CE202PES04	ENGINEERING MECHANICS LAB	-	-	2	30	20	50	1
3.	CS202PES05	COMPUTER PROGRAMMING LAB	-	-	2	30	20	50	1
		Total	-	-	6	90	60	150	3
	GRAND TOTAL		17	3	6	240	410	650	21

Total Credits   :   21
Total Contact Hour   :   26
Total Marks   :   650

*INTERNAL ASSESSMENT- Two Class Test of 15 Marks each will be conducted.
L-LECTURE, T-TUTORIAL, P-PRACTICAL, ESE –END SEMESTER EXAMINATION

SYLLABUS	(SEMESTER-I)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	MA201TBS01	L	T	P	CT-I	CT-II	TOTAL	70	100	04
Subject:	MATHEMATICS-I	3	1	–	15	15	30			

Course Content
Calculus (Single Variable)
UNIT 1: Calculus: Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Asymptotes: definition, properties and problems.
Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L' Hospital's rule; Maxima and minima.

UNIT 2: Sequences and series: Convergence of sequence and series, tests for convergence, power series, and Taylor's series. Series for exponential, trigonometric and logarithmic functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

UNIT-3: (A): **Multi variable Calculus (Differentiation):** Limit, continuity and partial derivatives, directional Derivatives, total Derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

(B): *Multivariable Calculus (Integration):* Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes by (double integration) Center of mass and Gravity (constant and variable densities). Theorems of Green, Gauss and Stokes, orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.

UNIT – 4 (A): Matrices (in case vector spaces is not to be taught): Algebra of matrices, Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; CayleyHamilton Theorem, Orthogonal transformation and quadratic to canonical forms.

(B) Matrices (in case vector spaces is to be taught): Matrices, vectors: addition and scalar multiplication, matrix multiplication; linear systems of Equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

UNIT-5 (A): Vector spaces: Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps, Matrix associated with a linear map.

(B) Vector spaces: Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigenbasis. Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

Textbooks/References:
1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 Reprint, 2010.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
5. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
6. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks Cole, 2005.
7. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
8. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

SYLLABUS	(SEMESTER-I)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	CY201TBS02/ CY202TBS04	3	1	-	15	15	30	70	100	04
Subject:	CHEMISTRY									

Course Learning Objectives:

The objective of this Course is to:

· To make aware and enrich the the students about the basic concept and understanding of chemical concepts of basic Chemistry and spectroscopic techniques.

Course Content:

UNIT-1: Concept of Quantum Energy and Spectroscopy: Quantization of Energy, Regions of spectrum. Electronic Spectroscopy: Electronic Transition, Woodward Fieser rules for calculating λ_{max} of conjugated dienes & α, β-unsaturated carbonyl compound, various shifts in λ_{max} and intensities. Infra-Red Spectroscopy: Conditions for Infra-Red Spectroscopy, Molecular vibrations & factors affecting Infra-Red frequencies**.**

UNIT-2: Chemical Bonding in Molecules: Introduction of chemical bonding, VSEPER Theory, V. B. Theory and Molecular Orbital Theory. Energy level diagrams of diatomic molecules and ions.

UNIT-3: Concept of Chirality, Enantiomers, Diastereomers, Meso-compounds and Racemic mixtures. Conformation of Acyclic hydrocarbons (Ethane, Propane & n-Butane) and cyclic hydrocarbon (Cyclohexane), Plane of symmetry, Centre of symmetry, Absolute and Relative Configuration (R &S, D & L and E & Z).

UNIT -4: Reactivity of Organic Molecules, Factors influencing acidity, basicity and nucleophilicity of molecules, kinetic vs thermodynamic control of reactions.

UNIT -5: Strategy for Synthesis of Organic Compounds: Reaction intermediates: Stability of Free Radicle, Carbocation and Carbanion. Introduction to reaction involving Addition, Elimination, Substitution and Ring opening and Cyclization.

Textbooks/References:
1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publication Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.
3. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
4. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
5. A textbook of Engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition

6. Applied Chemistry by H.D. Gesser, Springer Publishers.

7. Textbook of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

8. B. Siva Shankar, "Engineering Chemistry", Tata Mc Graw Hill Publishing Limited, 3rd Edition, 2015.

9. S. S. Dara, Mukkanti, "Text of Engineering Chemistry", S. Chand & Co, New Delhi, 12th Edition, 2006.

10. C. V. Agarwal, C. P. Murthy, A. Naidu, "Chemistry of Engineering Materials", Wiley India, 5th Edition, 2013.

11. R. P. Mani, K. N. Mishra, "Chemistry of Engineering Materials", Cengage Learning, 3rd Edition, 2015.

Course Outcomes- At the end of the course the students will be able to understand and solve the practical problems of their higher Engineering classes on the basis of understanding of Chemistry developed in their B. Tech. I sem classes.

SYLLABUS	(SEMESTER-I)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE201TES01 / CE202TES03	3	1	-	15	15	30	70	100	04
Subject:	ENGINEERING MECHANICS									

Course Learning Objectives:

To learn about

- The concepts Force systems, free body diagrams, resultant of forces and equations of equilibrium, Supports and support reactions and calculation of Centroid
- The Concept of moment of inertia of plane figures, Laws and applications of friction
- The Analysis of the truss and determination of axial forces by Method of Joints
- Motion of a body and their relationships and application of D Alembert's principle in rectilinear and curvilinear motions

Course Content:

UNIT- 1: Introduction to Engineering Mechanics covering, Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems

UNIT-2: Friction covering, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies.
Basic Structural Analysis covering, Equilibrium in three dimensions; Method of Sections; Method of Joints; Simple Trusses; Zero force members.

UNIT 3: Centroid and Centre of Gravity covering, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections.

UNIT-4: Virtual Work and Energy Method-Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency.

Review of particle dynamics- Rectilinear motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

UNIT-5: Introduction to Kinetics of Rigid Bodies covering, Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation

Textbooks/References:
1. Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
2. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill
3. Andy Ruina and Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford University Press
4. Shanes and Rao (2006), Engineering Mechanics, Pearson Education,
5. Hibler and Gupta (2010), Engineering Mechanics (Statics, Dynamics) by Pearson Education
6. 6. Bansal R.K. (2010), A Text Book of Engineering Mechanics, Laxmi Publications
7. Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.
8. Tayal A.K. (2010), Engineering Mechanics, Umesh Publications

Course Outcomes- On successful completion of teaching-learning and evaluation activities,   a student would be able to
- Identify and analyze the problems by applying the fundamental principles of engineering mechanics
- and to proceed to research, design and development of the mechanical systems.
- Construct free body diagrams and use appropriate equilibrium equations, Calculate unknown forces in
- a plane by resolution of force and equilibrium equations
- Locate Centroid of composite figures and determine moment of plane figures
- Analyze the systems with friction
- Determine the axial forces in the members of determinate truss.
- Calculation of acceleration, velocity and displacement and forces
- Calculation of angular displacement, velocity and angular acceleration of rotational bodies

SYLLABUS	(SEMESTER-I)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	CS201TES02 / CS202TES04							70	100	03
Subject:	COMPUTER PROGRAMMING	3	0	-	15	15	30			

Course Learning Objectives:
- To understand the basic of Idea of Algorithm.
- To understand the programing concept of Arithmetic expressions and Basic Algorithms ·
- To learn the Functions and Structure of array.

Course Content:

UNIT-1: Introduction to Programming
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) -

Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

UNIT-2: **Arithmetic expressions and precedence**
Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching Iteration and loops, **Arrays** (1-D, 2-D),Character arrays and strings

UNIT-3: Basic Algorithms
Searching, concept of binary search etc, Basic Sorting Algorithms Bubble sort etc, Finding roots of equations, introduction of Algorithm complexity

UNIT-4: Function
Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference binary search etc. **Recursion**

functions Recursion, as a different way of solving problems. Example programs, such as, Finding Factorial, Fibonacci series, etc.

UNIT -5: Structure
Structures, Defining structures and Array of Structures

Pointers Idea of pointers, defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

Textbooks/References:
1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
3. Brian W. Kernighan and Dennis M. Ritchie, the C Programming Language, Prentice Hall of India

Course Outcomes- At the end of the course students will be able to
- Develop the algorithm and programmers for various applications using Arithmetic expressions, arrays, pointers and Functions.

SYLLABUS	(SEMESTER-I)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CM201TES03 / CM202TES05	L	T	P	CT-I	CT-II	TOTAL	70	100	03
Subject:	BASIC CIVIL & MECHANICAL ENGINEERING	3	0	–	15	15	30			

Course Learning Objectives:

- To study the properties and uses of basic civil engineering materials.
- To study the importance of NBC, IS Codes (materials), types of buildings and foundations, basic requirements of foundations.
- To study the basic types of surveys, linear and angular measurements, and GPS measurements
- To familiarize with the fundamentals of heat and work interactions, heat transfer mechanisms and energy conversion processes.
- To provide exposure to various engineering materials and processes of manufacturing.
- To impart basic knowledge of the interdisciplinary nature of engineering systems.

Course Content:

UNIT 1: Civil Engineering Materials: Properties & Uses of Stones, Bricks, Cement, Aggregates, Steel, Concretequality of good concrete, strength, curing and grade of concrete, standard tests on concrete. IS Codes and classification

UNIT 2: National Building Code (NBC), Salient features, Classification of Building as per NBC(India), Site selection for buildings - Components of building, Foundations-Introduction, Types of Foundations & its Suitability, Basic requirements and purpose of foundation on different soils. Brief description about: Brick & stone masonry, Plastering, Lintels; Doors & Windows, Beams & columns, Formwork, Roofs.

UNIT 3: Surveying: Objects, uses, Basic principle, Classification, Plans & Maps, Scales, Units of measurement, Conventional symbols, Different survey equipment. Measurements – Linear & Angular, levelling, Determination of Area & Volume, Introduction to Triangulation and GPS

UNIT 4: Materials and Manufacturing, Introduction to engineering materials – metals, alloys, composites, smart materials, phase-change materials; Introduction to various processes of manufacturing – conventional machine tools – lathe and its types, shaping, milling and related operations – turning, threading, knurling, etc., unconventional methods.

UNIT 5: Automobile and Refrigeration and Air conditioning, Theoretical thermodynamic cycles and working principle of Petrol and Diesel Engines – Hybrid and Electric Vehicle - Turbines, Pumps, Compressors. Principle of vapour compression and absorption refrigeration system–Layout of typical domestic refrigerator–Window and Split type room Air conditioner. Introduction to renewable energy utilization and technology.

Textbooks/References:
1. Punmia, B.C, Ashok Kumar Jain, Arun Kumar Jain, Basic Civil Engineering, Lakshmi Publishers, 2012.
2. Satheesh Gopi, Basic Civil Engineering, Pearson Publishers, 2009.
3. Rangwala, S.C, Building materials, Charotar Publishing House, Pvt. Limited, Edition 27, 2009.
4. Palanichamy, M.S, Basic Civil Engineering, Tata McGraw Hill, 2000.
5. Elements of Workshop Technology Vol. 1 – S.K. Hajra Choudhary, A.K. Hajra Choudhary – Media promoters & Publishers Pvt. Ltd.
6. Basic Automobile Engineering – R.B. Gupta, Satya Prakashan.
7. Shanmugam, G and Palanichamy, M S, Basic Civil and Mechanical Engineering, Tata McGraw Hill
8. National Building Code (NBC) – Bureau of Indian Standards
9. Bureau of Indian Standard Codes for Civil Engineering Materials

Course outcome
At the end of the course, the students will be
1. able to gain the knowledge on the basic civil engineering materials
2. able to know the importance of NBC and relevance of IS Codes to Civil engineering materials, site selection of a building and its components and materials
3. exposed to various types of surveys, linear and angular measurements and GPS measurements
4. Be able to relate with processes in various energy conversion devices involving heat and work.
5. Be able to identify and suggest various processes of manufacturing and materials involved.
6. Be able to appreciate the interdisciplinary existence between heat, work, fluid flow and manufacturing processes.

SYLLABUS	(SEMESTER-I)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	LW201TMC01	L	T	P	CT-I	CT-II	TOTAL	--	--	--
Subject:	INDIAN CONSTITUTION	2	0	-	-	-	-			

Course Learning Objectives:

- To the importance of preamble of the constitution of India.
- To understand the fundamental rights and duty as a citizen of India.
- To understand the functioning of union and state government and their inter-relationship.

Course Content:

UNIT 1: Introduction: Constitution-meaning of the term, Sources and constitutional theory, Features, Citizenship. Preamble**.**

UNIT 2: Fundamental Rights and Duties: Fundamental Rights, Fundamental Duties, Directive Principles of State Policy

UNIT 3: Union Government: Structure of Indian Union: Federalism, Centre-State relationship President: Role.

Power and position, Prime Minister and council of ministers, Cabinet and Central Secretariat, Lok Sabha. Rajya Sabha

UNIT 4: State Government: Governor: Role and position, Chief Minister and council of ministers, State Secretariat

UNIT 5: Relationship between Centre and States: Distribution of Legislative Powers, Administrative Relations, Coordination between States

Textbooks/References:
1. Constitution of India, V.N. Shukla
2. The Constitutional Law of India, J.N. Pandey
3. Indian Constitutional Law. M.P. Jain

Course Outcome: At the end of the course students will be able to:

- Describe the salient features of the Indian Constitution
- List the Fundamental Rights and Fundamental Duties of Indian citizens
- Describe the Directive Principles of State Policy and their significance

SYLLABUS	(SEMESTER-I)	Periods/ Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
Subject Code:	CY201PBS01 / CY202PBS02	L	T	P	IA	MSE	TOTAL	20	50	01
Subject:	CHEMISTRY LAB	0	0	2	30	-	30			

Course Learning Objectives:

The Lab sessions would help in learning:

- Application of iodometrically & titration in lab.
- Recognition of different chemical reaction.
- Advanced lab methods like Spectro photometry and chromatography

Course Content:
Group – A:

1. Standardization of sodium thiosulphate solution by standard potassium dichromate solution.
2. To determine the Normality and Strength (g/L) of given Ferrous Ammonium Sulphate solution 'A' using standard Ferrous Ammonium Sulphate (N/30) solution 'B' taking KMnO4 solution as an intermediate.
3. To determine the concentration of hypo solution ($Na_2S_2O_3.5H_2O$) iodometrically with given Iodine (N/50) solution.
4. Find out the Temporary hardness of given water sample using 0.01M EDTA solution, buffer solution (pH-10) and EBT as an indicator.
5. To determine chloride ion in a given water sample by Argentometric method (Mohr's method)

Group – B:

6. Preparation of Urea Formaldehyde resin.
7. Acetylation of Primary Amine: Preparation of Acetanilide.
8. Base Catalyzed Aldol Condensation: Synthesis of dibenzalpropanone.
9. [4+2] Cycloaddition Reaction: Diels-Alder reaction.
10. Preparation of aspirin and calculate its yield.

Group – C:

11. To calculate the λ_{max} of a given compound using UV-visible spectrophotometer.

12. To separate the metallic ions by paper chromatography.

13. To determine the surface tension of a liquid by stalagmometer.

14. To determine the percentage composition of the given mixture consisting of two liquids A and B (non- interacting system) by viscosity method.

15. To determine the relative viscosity of given liquids by Ostwald's viscometer.

Note: At least two Experiments from each group must be performed.

Course Outcomes- On completion of the course, the students will be able to handle the chemicals of synthesis as well as titration that will ultimately make them efficient and develop their future chemistry laboratory skills .

SYLLABUS (SEMESTER-I)		Periods/ Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
		L	T	P	IA	MSE	TOTAL			
Subject Code:	CS201PES02 / CS202PES05							20	50	01
Subject:	COMPUTER PROGRAMMI NG LAB	-	-	2	30	--	30			
	LAB									

Course Learning objectives:

- To perform the practical giving basic understanding to fundamental principles of mechanics like parallelogram of forces, triangle of forces and polygon of forces by universal force table

- To perform the practical giving basic understanding to fundamental application of mechanics like screw jack, winch crab and simple wheel and axle

Course Content:

List of Experiments

1. Verification of law of parallelogram of forces.
2. Verification of law of triangle of forces.
3. Verification of law of polygon of forces by universal force table.
4. Verification of law of moment by parallel forces apparatus.
5. Practical verification of forces in the member of jib crane.
6. Practical verification of forces in the member of the truss.
7. Determination of coefficient of friction between two given surfaces by inclined plane method.
8. Determination of efficiency of simple screw jack.
9. Determination of efficiency of single purchase winch crab.
10. Determination of efficiency of double purchase winch crab.
11. Determination of efficiency of simple wheel and axle.

Course Outcome: At the end of the course students will be able to:

- Verify the fundamental principles of mechanics like parallelogram of forces, triangle of forces and polygon of forces by universal force table

- Analyze the friction coefficient between two surfaces

- Calculate the efficiency of screw jack, winch crab and wheel and axle

SYLLABUS (SEMESTER-I)		Periods/ Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
		L	T	P	IA	MSE	TOTAL			
Subject Code:	CS201PES02 / CS202PES05							20	50	01
Subject:	COMPUTER PROGRAMMING LAB	-	-	2	30	—	30			

Course Learning Objectives:

 To learn the Branching and logical expressions and Loops
•
     To learn the Arrays and Function
•
     To understand the Numerical methods and Recursion

Course Content:
The laboratory should be preceded or followed by a tutorial to explain the approach or Algorithm to be implemented for the problem given.]

Tutorial 1: Problem solving using computers:

Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:

Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:

Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:

Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:

Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings

Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:

Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical Integration):

Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls

Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation

Lab 11: Pointers and structures

Course Outcomes- At the end of the course students will be able to
•   Utilization of Branching and logical expressions and Loops, Arrays and Function and Numerical methods and Recursion for writing the programmes for various engineering applications

SYLLABUS	Periods/	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	MA202TBS03							70	100	4
Subject:	MATHEMATICS-II	3	1	-	15	15	30			

Course Content:

UNIT 1: First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT 2: Ordinary differential equations of higher orders (Prerequisite 2c, 4a) second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

UNIT 3: Partial Differential Equations – First order (Prerequisite 5a-b): First order partial differential equations, solutions of first order linear and non-linear PDEs.

UNIT 4: Partial Differential Equations– Higher order (Prerequisite 5b-c) Solution to homogenous and nonhomogenous linear partial differential equations second and higher order by complimentary function and particular integral method. Flows, vibrations and diffusions, second-order linear equations and their classification, Initial and boundary conditions (with an informal description of well-posed problems).

UNIT 5: D'Alembert's solution of the wave equation; Duhamel's principle for one dimensional wave equation. Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, cylindrical and spherical polar coordinates, solutions with Bessel functions and Legendre functions. One dimensional diffusion equation and its solution by separation of variables. Boundary-value problems: Solution of boundary- value problems for various linear PDEs in various geometries.

Textbooks/References:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &Sons, 2006.
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th   Edition, Wiley India, 2009.

3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

4. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.

5. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.

6. G.F. Simmons and S.G. Krantz, Differential Equations, Tata McGraw Hill, 2007.

7. S. J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover Publications, 1993.

8. R. Haberman, Elementary Applied Partial Differential equations with Fourier Series and Boundary Value Problem, 4th Ed., Prentice Hall, 1998.

9. Ian Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1964.

10. Manish Goyal and N.P. Bali, Transforms and Partial Differential Equations, University Science Press, Second Edition, 2010

11. Denian murry,defferential equations ,oxford publications

SYLLABUS	(SEMESTER-II)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	PH201TBS02 / PH202TBS04	L	T	P	CT-I	CT-II	TOTAL	70	100	04
Subject:	PHYSICS	3	1	-	15	15	38			

Course Learning Objectives:

- To know the basic principles, effects and applications such as physical, optical parameters used for engineering applications.

- To learn about various laws and applications of electromagnetic theory.

- To know the basic structure, working principles and applications of lasers and optical fibre communication.

- To know the basics of semiconductor physics, semiconductor materials and devices and its characterization for advance technological applications

- To familiarize the basis of quantum theory and to make students to solve the physical problems for advancement of the technology.

Course Content:

UNIT 1: Optics: Interference and Diffraction
Introduction, Young's experiment theory of interference, Coherent and non-coherent sources, Fresnel's Bi- prism and Newton's ring experiment. Diffraction of light, Fresnel and Fraunhofer's diffraction, diffraction due to plane diffraction grating.

UNIT 2: Electromagnetic Theory
Coulomb's law electrostatics field and potential, electric flux, Gauss' law, Poisson's and Laplace's equation. Equation of continuity for charge conservation, Ampere's and Faraday's laws, Maxwell's Electromagnetic equations.

UNIT 3: Laser and Fiber optics
Introduction, elementary idea of spontaneous and stimulated emission, active medium population inversion, Einstein's coefficients, Types of lasers and important applications of lasers. Introduction to optical fibers, basic principles of optical fiber, critical angle numerical aperture, maximum acceptance angle, classification of optical fiber.

UNIT 4: Semiconductor physics and Devices
Formation of energy in solids, Energy band gap of metals, insulators and semiconductors, classification of semiconductor: Intrinsic and Extrinsic semiconductors, Fermi levels in intrinsic and extrinsic semiconductors, Electrical conductivity in

conductors and semiconductors, working of P-N junction diodes and bipolar junction transistor.

UNIT 5: Introduction to Quantum Mechanics
Introduction to Quantum Mechanics, photoelectric effect, Compton effect, wave-particle duality, uncertainty principle, wave function, De-Broglie waves, phase and Group velocity, Davisson and Germer experiment, Schrodinger wave equation, particle in a box (I-Dimensional)

Textbooks/References:

1. Applied physics-I and II By Navneet Gupta, Dhanpat Rai & Co.
2. Engg. Physics by S. K. Srivastava and R.A. Yadav, New Age Pub. New Delhi

3. Engg. Physics by Uma Mukherjee, Narosa Publication.
4. Engg. Physics by M.N. Avadhanulu, S. Chand Pub.
5. Electricity and Magnetism by Rangwala and Mahajan, Tata McGraw Hill. 1998
6. Concepts of Physics Part-II by H. C. Verma, Bharati Bhawan (P&D), 1998
7. Modern physics by Beiser, McGraw Hill Inc. New York, Publication 1995
8. Modern physics by Mani and Mehta, East-West Press Pvt.Ltd.1998
9. Introduction to Electrodynamics, David Griffith
10. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc.(1995).
11. B.E.A. Saleh and M.C. Teich, Fundamentals of Photonics, John Wiley & Sons. Inc.2007).
12. S.M. Sze, Semiconductor Devices: physics and Technology, Wiley (2008)
13. Yariv and p.yeh, Photonics Optical Electronics in Modern Communications, Oxford University press, New York (2007)
14. P. Bhattacharya, Semiconductor Optoelectronic Devices, prentice Hall of India (1997)
15. Online course: "Semiconductor Optoelectronics" by M. R. Shenoy on NPTEL.
16. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak on NPTEL.

Course Outcomes: At the end of the course, students will be able to:

- Student's ability to understand the basic principles and applications of physical optics for physical parameters measurements such as length, thickness, aperture size etc.

- Student's will be able to design, characterized the lasers and optical fibers and their effective utilization in optical communications, imaging etc.

- Students demonstrate appropriate competence and working knowledge of laws of electromagnetic theory and semiconductor physics and devices for their advance applications

SYLLABUS	(SEMESTER-II)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	EC201TES01 / EC202TES04	3	1	-	15	15	30	70	100	04
Subject	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING									

Course Learning Objectives:

- To impart a basic knowledge of electrical quantities such as current, voltage, power, energy and. To provide working knowledge for the analysis of basic DC circuits used in electrical and electronic devices.

- To provide working knowledge for the analysis of basic AC circuits used in electrical and electronic devices and measuring instruments

- To explain the working principle, construction, applications of Transformer, DC machines and AC machines.

- To make students understand basics of Diodes and Transistors. • To impart knowledge about basics of Digital Electronics

Course Content:

UNIT-1: DC circuits (8 hours)

Electrical circuit elements (R, L and C), voltage and current sources, Ohm's Law, Kirchoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits. Mesh & nodal analysis, Star- Delta transformation and circuits.

UNIT-2: AC circuits (8 hours)

Representation of sinusoidal waveforms, average and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections. Three-phase power measurement- Two- Wattmeter method.
Construction and working principle of single-phase wattmeter and energy meter. Introduction to Sensors and Transducers.

UNIT-3: Electrical machines (8 hours)

Construction, classification, ideal and practical transformer, equivalent circuit, losses in transformers, tests, voltage regulation and efficiency.

Construction, Working Principle, losses and efficiency of DC Machines and three phase Induction Machine, DC motor.

UNIT-4: Semiconductor devices And application (8 hours)

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics.

UNIT 5: Digital Electronics (8 hours)

Binary Number System, Logic Gates, Combinational circuits, Boolean Algebra, De Morgan's Theorem, Half and Full Adders, Flip- Flops. Sequential circuits-Registers and Counters, A/D and D/A Conversion.

Suggested Text / Reference Books:

I. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
II. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
III. B L Theraja and AK Theraja," A Textbook of Electrical Technology- Vol-I & II, S. CHAND &Co ltd, 2013.
IV. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
V. Jacob Millman, Christos Halkias,, Chetan Parikh, "Millman's Integrated Electronics - Analog and Digital Circuit and Systems", 2nd Edition 2017
VI. Robert L Boylestad, Louis Nashlsky," Electronics devices and circuit theory", Pearson 11th edition 2013
VII. M. Morris Mano ," Digital Logic and Computer Design", Pearson, 2004.

Course Outcomes: At the end of the course students will be able to:

- To understand and revise concepts of DC circuits.
- To learn to solve single and three phase AC circuits and basics of sensors and measurements.
- To understand the theory, working principle and applications of Transformer and basic machines and analyse their parameters.
- To understand characteristics of diodes and transistors and to analyze basic circuits using diodes.
- To learn the basics of digital circuits and its importance.

SYLLAUS	(SEMESTER-II)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL	70	100	02
Subject Code:	IT201TES02 / IT202TES05									
Subject:	INTRODUCTION TO INFORMATION TECHNOLOGIES	2	0	-	15	15	30			

Course Learning Objectives:

1. To illustrate the concepts of cyber security and familiar and aware with various cybercrimes attack and their prevention.
2. To describe the different services model of Cloud Computing and understand Understanding of different evaluating computer model of cloud computing.
3. To relate theoretical concepts with problem solving approach in IoT and assess the comparative advantages and disadvantages of Virtualization technology.
4. To provides the basic knowledge of use appropriate storage and access structures. the student must be able to analyse familiar with the machine learning algorithms and applications of various data science.
5. To integrate classroom learning into an everyday communicative activity in distributed system. Familiar with various web services activity.

Course Content:

UNIT 1: Cyber Security
Fundamentals Security Concepts: Authentication, Authorization, Non-repudiation, Confidentiality, Integrity, availability. Cyber Crimes and Criminals: Definition of cyber-crime, types of cyber-crimes and types of cybercriminals.

UNIT 2: **Cloud Computing Fundamentals**
Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of

Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models.

UNIT 3: Internet of Things
Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IOT Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and

Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

UNIT 4: Data Science

Introduction and Importance of Data Science, Statistics, Information Visualisation, Data Mining, Data Structures, and Data Manipulation, Algorithms used in Machine Learning, Data Scientist Roles and Responsibilities. Data Acquisition and Data Science Life Cycle.

UNIT 5: Evaluation and Emergence of Web Services

Evaluation of Distributed Computing, Core Distributed Technologies, Challenges in Distributed System, and

Introduction to web services, Web Services Architecture, Basic steps of implementing web services

Textbooks/References:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J.David Irwin.CRC Press T&F Group
3. Cloud Computing Principles and Paradigm by Rajashekar Buyya, James Broberg, Andhrz M. Wiley 2011.
4. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.
5. Mining of Massive Datasets, by Leskovec, Rajaraman, and Ullman.
6. R. Nagappan, R.Scokzylas, R.P. Sriganesh, Developing Web Services, Wiley India.

Course Outcomes:

1. Ability to learn about cybercrimes and how they are planned.
2. Ability to understand the cloud computing concepts and services model.
3. Ability to understand Internet of Things –Definition and Characteristics of IoT.
4. Explain how data is collected, managed and stored for data science. Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists
5. Understand the details of web services Evolution of Distributed Computing.

SYLLABS	(SEMESTER-II)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL	70	100	03
Subject Code:	EN202THS01									
Subject:	ENGLISH COMMUNICATION	3	0	-	15	15	30			

Course Learning Objectives

· To build up word power, to brush up the knowledge of English grammar, to develop good writing and speaking skills in the students

Course Content:

UNIT 1: Vocabulary Building

The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations.

UNIT 2: Basic Writing Skills

Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely

UNIT 3: Identifying Common Errors in Writing

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés

Unit 4: Nature and Style of sensible Writing

Describing, Defining, Classifying, Providing examples or evidence, Writing introduction and conclusion.

UNIT 5: Writing Practices

Comprehension, Précis Writing, Essay Writing.

Oral Communication (This unit involves interactive practice sessions in Language Lab) Listening Comprehension

Pronunciation, Intonation, Stress and Rhythm

Common Everyday Situations: Conversations and Dialogues

Communication at Workplace

Interviews

Formal Presentations

Textbooks/References:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007 (iii)On Writing Well. William Zinsser. Harper Resource Book. 2001
3. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
4. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
5. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Course Outcome:

At the end of the course students will be able learn a lot of new words. They also learnt the particularities and peculiarities of English grammar. As a result, they could speak and write English with the least possible error

SYLLABUS (SEMESTER-II)		Periods/Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
		L	T	P.	IA	MSE	TOTAL			
Subject Code:	PH201PBS01/ PH202PBS02							20	50	01
Subject:	PHYSICS LAB	-	-	2	30	--	30			

Course Learning Objectives:

· To learn and perform the various practical related to optical components characterization, semiconductor material and devices characterization and know their applications in advance areas such as communication, industries, defence, navigation etc.

 Course Content:

LIST OF PRACTICALS:

1. To determine the wavelength of sodium light with help of Fresnel's Bi-prism.
2. To determine the refractive index and dispersive power of the material of prism with the help of spectrometer.
3. To determine the sodium light by Newton's ring method.
4. To determine the wavelength of sodium light by plane diffraction grating using spectrometer.
5. To demonstrate the diffraction pattern and determine the wavelength of different colours of mercury (white) light using plane diffraction grating and spectrometer.
6. To determine the wavelength and number of line per cm on a diffraction grating using semiconductor laser diode.
7. To determine the specific rotation of sugar solution with the help of polarimeter.
8. Determine the width of the single slit and diameter of circular aperture using Fraunhofer diffraction pattern produced by semiconductor laser diode.
9. To determine the energy band gap (E_g) of a semiconductor material using P-N junction diode.
10. To determine the e/m ratio by the Thomson's method.
11. To study the P-N junction diode characteristics, in forwarded and reverse bias conditions.
12. To study the Zener diode characteristics.
13. To study the characteristics and gain of Transistor in C-B and C-E mode.
14. Determine the Planck's constant.

Course Outcomes: On completion of the course, the students would be able to:

·
     Know about basic optical facts and phenomenon, characterization of optical components and devices

- To know the basic semiconductor materials and devices and their applications
- To know how the performance of semiconductor devices can be improves.

SYLLABUS	(SEMESTER-II)	Periods/Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
Subject Code:	ME201PES01/ ME202PES03	L	T	P	IA	MSE	TOTAL			3
Subject:	ENGINEERING GRAPHICS	1	0	3	30	–	30	20	50	

Course Learning Objectives:
- To learn the basic of Engineering Drawing and Orthographic Projections
- To learn the Sections and Sectional Views of Right Angular Solids
- To learn the Isometric Projections covering and overview of Computer Graphics

UNIT 1: Introduction Engineering Graphics and Engineering Curves: Principles of engineering graphics and their significance – drawing instruments and their use – conventions in drawing – lettering – BIS conventions. Dimensioning rules, geometrical construction. Engineering Curves - Conic Sections, Special Curves-Cycloids, Epicycloids, Hypocycloids, Involutes and trochoid.

UNIT 2: Projection of Points, Straight lines and Planes: Principles of orthographic projections – conventions – first and third angle projections. Projections of points and lines inclined to both the planes. Projections of regular planes, inclined to both planes

UNIT 3: Projections Solids: Introduction, Type of solid, Projections of solids in simple position, Projection of solids with axes inclined to one of the reference planes and parallel to the other, Projections of solids with axes inclined to both H.P. and the V.P.

UNIT 4: Section of Solids and Development of Surfaces: Sectioning of regular solids - Section planes perpendicular to one plane and parallel or inclined to other plane - Development of surfaces of right, regular solids – development of prisms, cylinders, pyramids, cones and their parts.

UNIT 5: Isometric Projections and Orthographic Views: Principles of Isometric Projections-Isometric Scale- Isometric Views Conventions-Plane Figures, Simple and Compound Solids. Conversion of isometric views to orthographic views. Conversion of orthographic views to isometric projections, vice-versa. Introduction to perspective projection.

Computer Aided Drafting: Introduction to computer aided drafting package to make 2-D drawings.

Demonstration purpose only - not to be included in examinations.

Textbooks/References:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, PearsonEducation
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
5. CAD Software Theory and User Manuals

Course Outcomes:
1. At the end of the course, the student shall be able to
2. Draw engineering curves, orthographic projections of lines, planes and solids.
3. Draw sections of solids including cylinders, cones, prisms and pyramids. 4. Make development of surfaces, Orthographic and Isometric projections
5. Overview of Computer Graphics.

SYLLABUS	(SEMESTER-II)	Periods/Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
Subject Code:	EC201PES01V EC202PES05	L	T	P	IA	MSE	TOTAL			
Subject:	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	--	--	2	30	--	30	20	50	1

Course Learning Objectives:
- To understand basic electrical wiring, measurements, errors and method.
- To practically provide the concept of different theorems.
- To have actually hands-on on machines like transformers, DC and AC machines to get better understanding.
- To get experimental knowledge of Diodes and Transistors
- To make students learn Digital logic design.

Course Content:
List of experiments/demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope).
3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and Verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
4. Transformers: Polarity test, OC & SC tests. Loading of a transformer: measurement of primary and secondary voltages and currents and power.
5. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), and single-phase induction machine.
6. Study of Diodes and transistors characteristics.
7. Study of full-wave and half-wave rectifier.
8. Verification of De Morgan's theorems.
9. Study of Logic gates.
10. Study of half and full adder.

Course Outcomes: At the end of the course students will be able to:

- Acquire knowledge about different types of meters and take readings and Construct circuits and measure different electrical quantities.

- Analyze Single Phase and Three phase AC Circuits, the representation of alternating quantities and determining the power in these circuits

- Work on machines like transformers

- Acquire knowledge about different types of diodes and transistors

- Design and understand digital logic circuits

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
SECOND YEAR, SEMESTER - III & IV
W.E.F. SESSION 2020-21

Branch:- Computer Science & Engg. **Year: II** **Sem:- III**

S.No	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS03TES03	Computer Organization & Architecture	3	1	0	30	70	100	4
2	CS03TPC01	Digital logic & Design	3	1	0	30	70	100	4
3	CS03TPC02	IT workshop (C++ / python)	3	1	0	30	70	100	4
4	CS03TPC03	Computer Network	3	1	0	30	70	100	4
5	CS03TBS05	Mathematics III (Numerical Methods)	3	1	0	30	70	100	4
	PRACTICAL								
1	CS03PPC01	IT workshop (C++ / python) Lab	0	0	3	30	20	50	1.5
2	CS03PPC02	Digital Logic & Design Lab	0	0	3	30	20	50	1.5
3	CS03PES05	Computer Network Lab	0	0	3	30	20	50	1.5
			Total						**24.5**

Branch:- Computer Science & Engg. **Year: II** **Sem:- IV**

S.No	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS04TPC04	Discrete Mathematics	3	1	0	30	70	100	4
2	CS04TES04	Electronic Device & Circuits	3	0	0	30	70	100	3
3	CS04TPC05	Operating System	3	1	0	30	70	100	4
4	CS04TPC06	Data Structure & Algorithms	3	1	0	30	70	100	4
5	CS04TPC07	System Software	3	1	0	30	70	100	4
	PRACTICAL								
1	CS04PPC03	Data Structure & Algorithms Lab	0	0	3	30	20	50	1.5
2	CS04PPC04	Operating System Lab	0	0	3	30	20	50	1.5
3	CS04PES06	Electronic Device & Circuits Lab	0	0	3	30	20	50	1.5
							Total		**23.5**

Sub Title: COMPUTER ORGANIZATION & ARCHITECTURE		
Sub Code: CS03TES03	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. Conceptualize the basics of organizational and architectural issues of a digital computer.
2. Analyze processor performance improvement using instruction level parallelism.
3. Learn the function of each element of a memory hierarchy.
4. Study various data transfer techniques in digital computer.
5. Articulate design issues in the development of processor or other components that satisfy design requirements and objectives.

UNIT No	Syllabus Content	No of Hours
1	**Basic of Computer Organization & Architecture:** Introduction, Computer Organization vs. Computer architecture, Von Neumann Architecture vs. Harvard Architecture. **Input & Output Organization:** Introduction, Simple Bus Architecture, Types of Buses, I/O Communication Methodologies: Programmed I/O (Polling), Interrupt-driven I/O & Direct Memory Access (DMA), I/O channel & I/O Processor, Accessing I/O device: Memory Mapped I/O, Isolated or I/O Mapped.	10
2	**Computer Arithmetic:** Introduction, Addition & Subtraction: Addition & Subtraction with Signed-Magnitude Data, Hardware Implementation & Algorithm, Addition & Subtraction with Signed-2's Complement Data, Multiplication Algorithm: Hardware Implementation for Signed-Magnitude Data, Hardware Algorithm, Booth Multiplication Algorithm, Array Multiplier, Division Algorithms: Hardware Implementation for Signed-Magnitude Data & Algorithm , Carry Look Ahead Adder.	10
3	**Memory Organization:** Introduction, Types of Memory, Memory Hierarchy, Main Memory, Cache Memory, Virtual Memory, Associative Memory. Processor Organization: Introduction, Control Unit: Hardwired Control Unit, Micro programmed Control Unit, Instruction Set Computer: Reduced Instruction Set Computer (RISC) vs. Complex Instruction Set Computer (CISC).	10

4	**Pipelining:** Introduction, Concept of Instruction Pipeline, Design Problems with Pipeline: Structural Hazard, Data Hazard & Control Hazard, Extension in Pipeline Designed: Super Pipelining, Superscalar Processor, Very Long Instruction Width (VLIW) Architecture.	8
5	**Multiprocessor System:** Introduction, Shared Memory Multiprocessor, Distributed Memory Multiprocessor, Flynn's Classification: Single Instruction Single Data (SISD), Single Instruction Multiple Data (SIMD), Multiple Instruction Single Data (MISD), Multiple Instruction Multiple Data (MIMD), Cache Coherence, Message Passing Model, Cluster Computing, Distributed Computing.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the computer architecture concepts.
CO2: Understand and apply different number systems and codes.
CO3: Understand memory hierarchy and its impact on computer cost/performance.
CO4: Design a pipeline for consistent execution of instructions with minimum hazards.
CO5: Understand the concepts of multiprocessor.

Text Books:

1. Computer System Architecture, M. Morris Mano, Pearson Education India.
2. Computer Organization & Architecture, W. Stalling, Pearson Education India.

Reference Books:

1. Computer Architecture & Organization, J. P. Hayes, McGraw-Hill India.
2. Computer System Organization, Naresh Jotwani, Mc Graw Hill, India.
3. Computer System Architecture, P. V. S. Rao, PHI India.
4. Advanced Computer Architecture, Rajiv Chopra, S. Chand India.
5. Computer Organization & Architecture, Lalit K. Arora, Anjali Arora, S. K. Kataria & Sons, India.
6. Computer Fundamentals Architecture & Organization, B Ram, Sanjay Kumar, New Age International, India.

Sub Title: DIGITAL LOGIC & DESIGN		
Sub Code: CS03TPC01	**No. of Credits : 4=3: 1: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. The concept of various components.
2. The concepts that underpin the disciplines of analog and digital electronic logic circuits.
3. Various Number system and Boolean algebra.
4. Design and implementation of combinational circuits.
5. Design and implementation of Sequential circuits.

UNIT No	Syllabus Content	No of Hours
1	**Binary System:** Binary Number , Number Base conversion , Octal and Hexadecimal Numbers Complements, Binary Codes Binary Storage and Registers , Binary Logic , Integrated Circuits. **Boolean Algebra and Logic Gates:** Basic Definitions Axiomatic Definition of Boolean algebra .Basic Theorems and Properties of Boolean algebra Boolean Functions Canonical and Standard Forms .Other Logic Operations Digital Logic Gates . IC Digital Logic Families. NAND, NOR, EOR gates.	10
2	**Boolean Functions Combination Logic:** The map method Two and Three Variable Maps, Four Variable Map Product of sums Simplification, NAND and NOR implementation, Don't Care Conditions, The Tabulation Method **Combinational Logic:** Introduction, Design procedure Adders, Sub tractors .Code Conversion, Analysis Equivalence Functions	10
3	**Combinational Logic with MSI and LSI:** Introduction Binary Parallel Adder, Decimal, Adder, Magnitude Comparator, Decoders, Multiplexers, Read – Only Memory (ROM), Programmable Logic Array (PLA) Concluding Remarks	10
4	**SEQUENTIAL LOGIC:** Introduction, Flip –Flops, triggering of Flips –Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment. Flip –Flop Excitation Tables Design Procedure. Design of Counters, Design with State Equations.	8
5	**Registers, Counters, Memory Unit & FPGA Programing:** Introduction, Registers, shift Registers .Ripple Counters, Synchronous Counters. Timing Sequences, The Memory Unit Examples of Random Access Memories, FPGA: Introduction, FPGA Programming	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the concepts of various components to design stable analog circuits.
CO2: Represent numbers and perform arithmetic operations.
CO3: Minimize the Boolean expression using Boolean algebra and design it using logic gates.
CO4: Analyze and design combinational circuit.
CO5: Design and develop sequential circuits.
CO6: Translate real world problems into digital logic formulations using VHDL.

Text Books:

1. Digital Logic & Computer Design PH1 M Mano
2. Switching Circuit & Finite automata –ZVI Kohavi (TMH)
3. Fletcher W.I.: An engineering approach to Digital design PH1

Reference Books:

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

Sub Title: IT WORKSHOP (C++ / PYTHON)		
Sub Code: CS03TPC02	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. To know different programming paradigms.
2. To study and understand the object oriented programming concepts and methodology.
3. To implement object oriented programming concepts in C++.
4. To direct and handling file streaming
5. To learn introductory Python environment and program structure

UNIT No	Syllabus Content	No of Hours
1	**Abstract Data Types And Programming Environment:** TC++ Environment, variables, Compilation and Linking steps, functions and parameters Object identity, concept of Classes. arrays, control statements. C++ in different plate forms DOSBOX etc.	10
2	**Object-Oriented Programming:** Programming using class and objects, functions, return types, pointer, concepts of encapsulation, default, parametric ,hybrid and copy constructors, destructors, memory management operators	10
3	**Advance Concepts of Object-Oriented Programming:** Polymorphism operator and function overloading, Inheritance in object oriented design, Brief concepts of Aggregation, Generalization, Specification. Design concepts Flowchart , Decision table, virtual class and virtual functions	10
4	**File Handling:** Input &output Streams and object handling in file, Ios family class, text& binary files ,Basic character operations, file opening modes ios flags , ,seekg(),tell(),seekp(),tellp(),command line arguments Streaming and File input and output handling	8
5	**Introduction to Python:** Introduction of Python Programming: python programming environment, research areas and applications of python, Data representation, introductory level programming in python.	7

COURSE OUTCOMES: The students would have learnt

CO1: Programming environment and basic elements
CO2: Key features of the object-oriented programming language.
CO3: Advance concepts of object-oriented concepts.
CO4: Streaming concepts for file handling
CO5: Introduction of Python programming environment

Text Books:

1. Object Oriented Programming with C++ by E Balaguruswami, TMH 2019
2. Object Oriented Programming with C++ by Robert Lafore, Waite Group 2016
3. Machine Learning Tom M. Michell,Mc Graw Hill ,Indian addition
4. Applied Machine Learning by M. Gopal ,McGraw Hill Education

Reference Books:

1. Introduction to python by Bill Luboveni by O'Relly
2. Object Oriented Programming with C++ by M P Bhave S,A. Patekar, Pearson Education
3. The Complete reference by Herbit Schildt,Mc Graw Hill
4. C++ premier by F.B. Lippman, Addition Wesley
5. The C++ Programming Language,Bajanstroustrup ,Addition Wesley

Sub Title: COMPUTER NETWORK		
Sub Code: CS03TPC03	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. Discuss the basic taxonomy and terminology of the computer networking.
2. Discuss the functionality of different layers of OSI Model.
3. Discuss different protocols of TCP/IP protocol suite.
4. Discuss the process of IP addressing and working of routing protocols.
5. Discuss the different challenges of Internetworking, Congestion control and Quality of services.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** **Data communications:** Components, Data representation, Direction of data flow(simplex, half duplex, full duplex) **Networks:** Distributed processing, Network criteria, Physical structure (type of connection, topology), categories of network (LAN, MAN,WAN);Internet: brief history, internet today, Protocols and standard **Reference models:** OSI reference model, TCP/IP reference model, their comparative study. **Physical Layer:** Transmission technology.	10
2	**Data Link Layer:** Types of errors, Error detection & correction methods, Framing(character and bit stuffing), Flow control, Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ **Medium access sub layer:** Point to point protocol, Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, Token ring, Reservation, Polling, FDMA, TDMA, CDMA.	10
3	**Network Layer:** **Internetworking devices**: Repeaters, Hubs, Bridges, Switches, Router, Gateway **Addressing**: IP addressing, classful addressing, subnetting. **Routing**: Techniques, Static vs. Dynamic routing, Routing table for classful address, Flooding, Shortest path algorithm, Distance vector routing, Link state routing. **Protocols:** ARP, RARP, IP, ICMP, IPV6.	10

4	**Transport Layer:** Process to process delivery, UDP: Services and applications, TCP: Stream Oriented Service, Segment, Timers, Congestion control techniques: Avoidance and Detection.	8
5	**Application Layer:** DNS, SMTP, FTP, HTTP & WWW, **Security:** Cryptography, User authentication, Security protocols in internet, Firewalls. Recent research topic on networking.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the working of different internetworking devices.
CO2: Understand the working of Internet.
CO3: Understand the difference between OSI and TCP/IP.
CO4: Understand the security mechanism in Networking.
CO5: Understand core concept of IP addressing and routing.

Text Books:

1. Data Communications and Networking by B. A. Forouzan – TMH Publication.
2. Computer Networks by S. Tanenbaum – Pearson Education/PHI Publication.

Reference Books:

1. Internetworking with TCP/IP by Comer – Pearson Education/PHI by Publication.
2. Data and Computer Communications by W. Stallings – PHI Publication.

Sub Title: MATHEMATICS III (Numerical Methods)		
Sub Code: CS03TBS05	**No. of Credits : 4=3: 1: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	IA+ESE=30+70	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.
2. To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering which requires computing of numerical results using certain raw data.
3. To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.
4. To deal with various topics like finding roots of equations, solving systems of linear algebraic equations, interpolation and regression analysis, numerical integration & differentiation, solution of differential equation, boundary value problems, solution of matrix problems.
5. To facilitate numerical computing.

UNIT No	Syllabus Content	No of Hours
1	Introduction of Errors and their Analysis, types of errors, numerical problems on error analysis, curve fitting: method of least squares, fitting of exponential curves $y = ae^{bx}$, fitting of the curve $y = ab^x$, fitting of the curve $y = ax^b$. Method of moments	10
2	**Numerical Solution of Algebraic and Transcendental Equations:** Graphical method bisection Method, Secant Method, Regula-falsi Method, Newton Raphson Method, Solution of a system of simultaneous linear algebraic Equations Direct methods: Gauss elimination Method, Gauss Jordan method, Iterative methods .Jacobi Iterative Method, Gauss Seidel Iterative method.	10
3	**The Calculus of Finite Differences:** Finite differences, Difference formula, operators and relation between operators. Inverse Operator, Interpolation with equal intervals: - Newton's forward and backward interpolation formula. Interpolation with Unequal intervals: - Lagrange's interpolation Newton's difference formula, inverse interpolation.	10

4	**Numerical Differentiation and Integration:** Numerical Differentiation Newton's forward and Backward difference interpolation formula. Maxima and Minima of aTabulated function, Numerical Integration :-Trapezoidol rule, simpson's (1/3) rd and (3/8) th rule, Boole's rule, weddle rule. Difference Equations: Definition ,order and degree of a difference equation, Linear difference equations, Difference equations reducible to Linear form, simultaneous difference equations with constant coefficients	8
5	**Numerical solution of ordinary differential equation:** Taylor series method, Euler's method, Modified Euler method Runge's method Runge-Kutta method, numerical method for solution of partial differential equations. General linear partial differential equation.Laplace equation and Poisson equation.	7

COURSE OUTCOMES: The students would have learnt

CO1: Apply Numerical analysis, which has enormous application in the field of Science and some fields of Engineering.
CO2: Familiar with finite precision computation.
CO3: Familiar with numerical solutions of nonlinear equations in a single variable.
CO4: Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.
CO5: Familiar with calculation and interpretation of errors in numerical method.

Text Books:

1. Jain & Iyngar Numerical Methods for Scientific and Engineering Computations.
2. Rao G.S. Numerical Anlysis.
3. Grewal B S Numerical Methods In Engineering and Science.
4. Das K K Advance Engineering Methods.
5. Rajaraman V Computer Oriented Numerical Methods
6. P. Kandasamy K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
7. S. S. Sastry, Introduction methods of Numerical Analysis, PHI, 4th Edition, 2005.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Computer Networks by S. Tanenbaum – Pearson Education/PHI Publication.

Sub Title: IT WORKSHOP (C++ / PYTHON) LAB	
Sub Code: CS03PPC01	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To discuss Turbo C++ environment
2. To discuss the various basic object oriented programming constructs like functions, properties and application.
3. To discuss advanced programming concepts and program designing.
4. Discussion Programming on file input output handling
5. To discuss basic environment of python programming

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• To implement various datatypes and their memory requirement in TC++ programming • To implement various in classes and members functions. • To show matrix operation • To implement functions function and argument passing methods • To implement different function return types. • To implement concept of polymorphism. • To implement concept of virtual function and virtual class. • To implement the concept file handling. • To implement the concept of file importing in python environment. • To implement the concept of coding and execution of introductory program.	18

LAB OUTCOMES: The students would have learnt

CO1: TC++ programming Environment and programming IDE
CO2: Implementation of basic object oriented operations
CO3: Implementation of advanced programming concepts.
CO4: Implementation of file input output streams and file handling operations.
CO5: Implementation of introductory python programming language

Text Books:

1. Object Oriented Programming with C++ by E Balaguruswami, TMH
2. Object Oriented Programming with C++ by Robert Lafore, Waite Group
3. Introduction to python by Bill Luboveni by O'Relly

Reference Books:

1. Object Oriented Programming with C++ by M P Bhave S,A. Patekar, Pearson Education
2. The Complete reference by Herbit Schildt,Mc Graw Hill
3. The C++ Programming Language, Bajanstroustrup ,Addition Wesley
4. Machine Learning Tom M. Michell,Mc Graw Hill ,Indian addition
5. Applied Machine Learning by M. Gopal ,McGraw Hill Education

Sub Title: DIGITAL LOGIC & DESIGN LAB	
Sub Code: CS03PPC02	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To discuss the fundamental concepts of digital logic design
2. Identify various ICs and their specification.
3. To discuss various logic Gates
4. Design and implementation of combinational circuits.
5. Design and implementation of Sequential circuits

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Implement 3 input AND gate using 2 input AND gates and 3 input OR gate using 2 input OR gates. • Implement NAND gate using AND gates and NOR using OR gates. • Design a circuit that evaluates the determinant of a 2 X 2 binary matrix (Note: State any assumptions made about input and output representations). • Design a circuit that takes two unsigned 2-bit numbers (a and b), and displays one of greater (a > b), lesser (a < b) or equal (a == b) signals. • Half Adder, Full Adder and Ripple Carry Adder Implementation. • Add two 2 digit BCD numbers. Display using 7-segment displays. • Subtract two 2-digit BCD numbers. • Design Master Slave J-K Flip flop. • Design a 2-bit Synchronous up counter using D flip flop IC's. Display the output on a 7-segment LED display • Sequence generator using shift registers • Design and verify 4-bit synchronous counter.	18

LAB OUTCOMES: The students would have learnt

CO1: Understand the concepts of various components to design stable analog circuits.
CO2: Represent numbers and perform arithmetic operations.
CO3: Minimize the Boolean expression using Boolean algebra and design it using logic gates.
CO4: Analyze and design combinational circuit.
CO5: Design and develop sequential circuits

Text Books:

1. Digital Logic & Computer Design PHI M Mano
2. Switching Circuit & Finite automata –ZVI Kohavi (TMH)

Reference Books:

1. An engineering approach to Digital design PHI Fletcher W.I

Sub Title: COMPUTER NETWORK LAB	
Sub Code: CS03PES05	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To discuss the fundamental concepts of Networking.
2. To discuss the different devices used in Computer Network.
3. To discuss IP addressing concept like Subnetting and Supernetting.
4. To design Virtual LAN concept using port based and subnet based method.
5. To design WiFi System using Wireless Access Point and Adapter

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Study of different addresses (MAC, IP, Port and URL) used in computer network. • Study of different types of transmission media. • To implement point to point network using UTP cable and RJ-45 connector. • Study of different commands used in Computer Network. • Study of different networking devices used in Computer Network. • To implement Local Area Network using Unmanaged Switch. • To implement Local Area Network using Managed Switch. • To implement the Virtual LAN using port based method of Managed Switch. • To implement the Virtual LAN using subnet based method of Managed Switch. • To implement Wireless LAN using Wireless Access Point and Wireless Adapter.	18

LAB OUTCOMES: The students would have learnt

CO1: Understand the basic concept of Networking.
CO2: Understand the functionality of different devices.
CO3: Understand the designing of local Area Network using networking devices.
CO4: Understand addressing concept of networking.
CO5: Understand the designing of Wireless LAN.

Text Books:

1. Data Communications and Networking by B. A. Forouzan – TMH Publication.
2. Computer Networks by S. Tanenbaum – Pearson Education/PHI Publication

Reference Books:

1. Internetworking with TCP/IP by Comer – Pearson Education/PHI by Publication.
2. Data and Computer Communications by W. Stallings – PHI Publication

Sub Title: DISCRETE MATHEMATICS		
Sub Code: CS04TPC04	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contrapositives using truth tables and the properties of logic.
2. Express a logic sentence in terms of predicates, quantifiers, and logical connectives
3. Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion.
4. Determine the domain and range of a discrete or non-discrete function, graph functions, identify one-to-one functions, perform the composition of functions, find and/or graph the inverse of a function, and apply the properties of functions to application problems.
5. Describe binary relations between two sets; determine if a binary relation is reflexive, symmetric, or transitive or is an equivalence relation; combine relations using set operations and composition.

UNIT No	Syllabus Content	No of Hours
1	**Sets, Relation and Function:** Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.	10
2	Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination. Principle of Mathematical Induction, The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor, Euclidean Algorithm, The Fundamental Theorem of Arithmetic.	10
3	**Propositional Logic:** Basic Connectives and Truth Tables, Logical Equivalence, The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. **Proof Techniques:** Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.	10

4	**Algebraic Structures and Morphism:** Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form	8
5	**Graphs and Trees:** Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Four colour conjecture, trees and rooted trees, binary trees.	7

COURSE OUTCOMES: The students would have learnt

CO1: Students completing this course will be able to express a logic sentence in terms of predicates, quantifiers, and logical connectives.

CO2: Students completing this course will be able to apply the rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction.

CO3: Students completing this course will be able to use tree and graph algorithms to solve problems.

CO4: Students completing this course will be able to evaluate Boolean functions and simplify expressions using the properties of Boolean algebra

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Text Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG   Edition, TataMcgraw-Hill
3. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
4. Discrete Mathematics, Tata McGraw - Hill

Sub Title: ELECTRONIC DEVICE & CIRCUITS		
Sub Code: CS04TES04	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To understand practical applications of PN junction diode.
2. To study basic principle of BJT, JFET and MOSFET their characteristics and amplifiers.
3. To understand working of BJTs at low and high frequencies.
4. To understand the working of different types of feedback amplifiers.
5. To understand the working of different types of oscillators.
6. To Study the linear and non-linear application circuits of operational amplifiers.

UNIT No	Syllabus Content	No of Hours
1	**Junction Diode And Its Application:** Properties of P-N Junction, Open Circuited P-N Junction, Current component of PN Diode, V-I Characteristics, Temperature dependence of V-I Characteristics, Diode resistance, Diode as a rectifier-Half wave & Full wave rectifier, Clipper, Clamper.	8
2	**Bipolar Junction Transistor and FET:** Introduction to Bipolar Junction Transistor, Transistor current components. Transistor as an amplifier, Transistor construction, Transistor Circuit Configuration (Common Base , Common Emitter, Common Collector) and Characteristics CE current gain, Analytical expression for transistor characteristics. Introduction to JFET, MOSFET, V-I and Transfer characteristics of JFET.	7
3	**Low Frequency Transistor Amplifier**: Graphical Analysis of CE amplifier, h-parameter Models, Transistor hybrid model, Analysis of Transistor amplifier using H-Parameter for CB, CE, CC configurations, Comparison of Transistor Amplifier Configuration, Darlington Pair. **High Frequency:** CE hybrid-pi model: Validity and parameter Variation, Current Gain with Resistive load, frequency response of a single stage CE Amplifier, Gain-Bandwidth product.	7
4	**Feedback Amplifier**: Classification of feedback amplifier, Feedback concept, Properties of feedback amplifier, Effect of feedback on gain and impedance, Emitter and Source follower. **Oscillator:** Barkhausen criteria, Wien bridge, Tuned, Hartley, Colpitt and RC Phase shift oscillators.	7

5	**Operational Amplifiers:** OPAMP Symbol and terminal characteristics, Block Schematic of OPAMP, Ideal OPAMP Characteristics, Practical OPAMP Characteristics, Inverting Amplifier, Non-Inverting Amplifier, Voltage Follower, Adder, Substractor, Comparator, Integrator, Differentiator, IC Timer-555, Introduction to Multivibrators, Monostable, Bistable, Astable Multivibrator.	7

COURSE OUTCOMES: The students would have learnt

CO1: Learn the design practical circuit using diodes.
CO2: Learn the Characteristics of BJT, FET and MOSFET
CO3: Evaluate frequency response to understand behavior of Electronics circuits.
CO4: Analyze important types of integrated circuits and demonstrate the ability to design practical circuits that perform the desired operations.
CO5: Learn the Designing of different oscillator circuits for various frequencies.
CO6: Gain knowledge about Differential amplifier and operational amplifier and Designing circuits for op-amp applications.

Text Books:

1. Electronic Devices and Circuit Theory, Robert L. Boylestad & L. Nashelsky, K. L. Kishore, 9th Edition, PHI
2. Integrated Electronics: Analog & Digital Circuit Systems, Jacob Millman & Halkias, Tata McGraw Hill.
3. Microelectronics, Millman and Grabel, Tata McGraw Hill.
4. Integrated Circuits by K. R. Botkar, 9th Ed., Khanna Publications

Reference Books:

1. Electronic Devices & Circuits, Allen Mottershead, PHI.
2. Microelectronic Circuits, Sedra and Smith, 5th Edition, Oxford University Press.
3. Operational Amplifiers by R. Gayekwad, 4th Ed., Pearson Education

Sub Title: OPERATING SYSTEM		
Sub Code: CS04TPC05	**No. of Credits : 4=3: 1: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. To understand the main components of an OS & their functions.
2. To study the process management and scheduling.
3. To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.
4. To understand the concepts and implementation Memory management policies and virtual memory.
5. To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS
6. To study the need for special purpose operating system with the advent of new emerging technologies

UNIT No	Syllabus Content	No of Hours
1	Introduction to Operating System objective and function. System components system services, system structure, batch interactive, time –Sharing and real time operating system, Protection. The introduction of window NT,DOS, Window 07, Unix ,Linux (Red hat)	10
2	**Concurrent Process:** Process concepts, principal of concurrency. The producer consumer problem, the critical section problem, semaphore, classical problem in concurrency, inter process communication, process generation, process scheduling.	10
3	**CPU Scheduling:** Scheduling concepts, performance criteria scheduling algorithms. Algorithm evaluation, multiprocessor scheduling. I/O management and Disk scheduling I/O devices and organization of the I/O functions. I/O buffering disk I/O operating system design issues.	10
4	Dead Locks system models, deadlock characterization, prevention, avoidance and detection recovery from deadlock, combined approach.	8

| 5 | **Memory Management:** Base machine , Residence monitor , multiprogramming with fixed partition , multiprogramming with variable partitions, multiple base register , paging , segmentation , paging segmentation, virtual memory concepts , demand paging performance , page replacement algorithms , allocation of frames, thrashing , cache memory organization impact on performance . | 7 |

COURSE OUTCOMES: The students would have learnt

CO1: Describe the important computer system resources and the role of operating system in their management policies and algorithms.
CO2: Understand the process management policies and scheduling of processes by CPU
CO3: Evaluate the requirement for process synchronization and coordination handled by operating system
CO4: Describe and analyze the memory management and its allocation policies.
CO5: Identify use and evaluate the storage management policies with respect to different storage management technologies.
CO6: Identify the need to create the special purpose operating

Text Books:

1. Milenkovic M. , Operating System concepts , MGH
2. Tanenbaubm A. S. Operating System design and implementation, PHI
3. Silberschartz A.and Patterson J.I. , " Operating system concepts ", Wisley.

Reference Books:

1. Stilling William, Operating System, Maxwell McMillan International Edition 1992.
2. Dectel H.N., An introduction to operating system, Addision Wisley.

Sub Title: DATA STRUCTURE & ALGORITHMS		
Sub Code: CS04TPC06	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. Understand and remember algorithms and its analysis procedure.
2. Introduce the concept of data structures through ADT including List, Stack, Queues.
3. To design and implement various data structure algorithms.
4. To introduce various techniques for representation of the data in the real world.
5. To develop application using data structure algorithms.
6. Compute the complexity of various algorithms.

UNIT No	Syllabus Content	No of Hours
1	String algorithms, pattern search and editing, Arrays algorithms, development simple examples of algorithm development, complexity, Divided & conquer, binary search, selection sort, insertion sort, merge sort, quick sort complexity of sorting.	10
2	Linear list: Stacks, application of Stacks, arithmetic notations, recursion, queues and circular queues, Linked list definition, insertion and deletion of nodes, circular and doubly linked list, Header nodes.	10
3	Trees, AVL trees, Threaded trees, Heap sort, B-tress.	10
4	**Graph and representation:** graph algorithms, optimization and Greedy methods, minimum spanning tree, shortest path, DFS, BFS search, examples of backtracking sets UNION and FIND operations tables and information retrievals, hashing.	8
5	Files: File organization, sequential file, direct file organization, index sequential file organization, Data storage and management.	7

COURSE OUTCOMES: The students would have learnt

CO1: Select appropriate data structures as applied to specified problem definition.
CO2: Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
CO3: Students will be able to implement Linear and Non-Linear data structures.
CO4: Implement appropriate sorting/searching technique for given problem.
CO5: Design advance data structure using Non- Linear data structure.
CO6: Determine and analyze the complexity of given Algorithms.

Text Books:

1. Data Structures and Algorithm Analysis in C++, 2/e by Mark Allen Weiss, Pearson Education Wirth Niclaus , Algorithm Data Structure Programs PHI
2. Horwitz E. and Sahani S. Fundamentals and Data Structure , Computer Science Press.
3. Knuth D. Threat of Computer Programming ", Vol 1-2 Addision - Wesley
4. Aho A.V.Hopcraft and Ullman J.E. "Data Structure and Algorithms, addsion Wesley.

Reference Books:

1. Tanonbaum , A. M. and Augenstein , M.J. "Data Structure with Pascal" PHI.
2. Trambley and Sorenson "Data Structure using Pascal, MGH.
3. Stubbs D. Data Structure with Abstract Data Type and Modula 2, Brooks & Cole Publication Comp.

Sub Title: SYSTEM SOFTWARE		
Sub Code: CS04TPC07	No. of Credits : 4=3: 1: 0(L-T-P)	No of lecture hours/week :04
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:45

COURSE OBJECTIVE:

1. To introduce student the fundamental model of the processing of high level language programs for execution on computer system.
2. To explain the basic operations that are performed from the time a computer is turned on until a user is able to execute programs.
3. To understand and implement Assembler, Loader, Linkers, Macros & Compilers.
4. To introduce students the process management and information management via different software tools.

UNIT No	Syllabus Content	No of Hours
1	**Machine architecture:** CPU Machine Architecture, Simplified Instruction Computer(SIC),SIC/XE, Traditional CISC Machines, VAX Architecture, Pentium Pro Machine Architecture, RISC Architecture, instruction set, Addressing modes, Type of addressing modes with example Programming review of syntax of C with emphasis on features like pointers, bit operations	10
2	**DOS:** Introduction to interrupts, software interrupts, Hardware interrupt, Internal structure of DOS, COM & EXE program's BIOS memory resident programs, Running batch files.	10
3	**Assemblers:** Types of Assembler, PASS-I Assembler, PASS-II Assembler, Cross assemblers, Two Pass assembler design data structure and algorithms.	10
4	**Macro processors:** Definitions, Nested macro definitions, Macro expansion and Conditional macro expansion.	8
5	**Linker and Loader:** Introduction of Linker and Loader, Types of Loader, Loading and Relocation, static and Dynamic linking, Editors, Types of Editors, Debuggers, Programming environments.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand different components of system software.
CO2: Understand intermediate code generation in context of language designing.
CO3: Recognize operating system functions such as memory management as pertaining to run time storage management

Text Books:

1. System Software: An Introduction to Systems Programming, Leland L. Beck, Pearson Education, 3 edition.
2. System Programming, Donovan J. J., TMH
3. Introduction to system software's, Dhamdhare D.M., TMH 1986
4. System Programming And Operating System, Dhamdhare ,TMH

Reference Books:

1. PC System Programming, Michael Tischer Abacus.
2. The Sprit of C, An Introduction to modern programming, Cooper Mullish, Jaico publication New Delhi 1987.
3. Programming with C, Schaum Series, Gottfried, TMGH.

Sub Title:	DATA STRUCTURE & ALGORITHMS LAB	
Sub Code: CS04PPC03		No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours		IA+ESE =30+20

Lab OBJECTIVE:

1. Understand and remember algorithms and its analysis procedure.
2. Introduce the concept of data structures through ADT including List, Stack, Queues.
3. To design and implement various data structure algorithms.
4. To introduce various techniques for representation of the data in the real world.
5. To develop application using data structure algorithms.
6. Compute the complexity of various algorithms.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	- To implement the CPP program for Insert the values in Array. - To implement the CPP program for Delete the values in Array. - To implement the CPP program for Update the values in Array. - To implement the CPP program for Addition, Subtraction and Multiplications of the integer values in Array. - To implement the CPP program for String algorithms. - To implement the CPP program for pattern matching in strings. - To implement the CPP program for insertion, deletion in one way LINK LIST. - To implement the CPP program for insertion, deletion in two way LINK LIST. - To implement the CPP program for insertion, deletion in circular LINK LIST. - To implement the CPP program for insertion, deletion in doubly LINK LIST. - To implement the CPP program for insertion, deletion in header LINK LIST. - To implement the CPP program for insertion, deletion in header doubly LINK LIST. - To implement the CPP program for TREE structure. - To implement the CPP program for pre-order, in-order, post-order of any Binary TREE. - To implement the CPP program for Binary search. - To implement the CPP program for Quick short. - To implement the CPP program for insertion sort. - To implement the CPP program for Bubble short etc	18

LAB OUTCOMES: The students would have learnt

CO1: Select appropriate data structures as applied to specified problem definition.
CO2: Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
CO3: Students will be able to implement Linear and Non-Linear data structures.
CO4: Implement appropriate sorting/searching technique for given problem.
CO5: Design advance data structure using Non- Linear data structure.
CO6: Determine and analyze the complexity of given Algorithms.

Text Books:

1. Data Structures and Algorithm Analysis in C++, 2/e by Mark Allen Weiss, Pearson Education Wirth Niclaus , Algorithm + Data Structure Programs, PHI
2. Fundamentals and Data Structure, by Horwitz E. and Sahani S., Computer Science Press.
3. Threat of Computer Programming, by Knuth D., Vol 1-2 Addision - Wesley
4. Data Structure and Algorithms, by Aho A.V.Hopcraft and Ullman J.E., addsion Wesley.

Reference Books:

1. Data Structure with Pascal, Tanonbaum , A. M. and Augenstein , M.J. PHI.
2. Data Structure using Pascal, by Trambley and Sorenson MGH.
3. Data Structure with Abstract Data Type and Modula by Stubbs D. 2", Brooks & Cole Publication Comp.

Sub Title: OPERATING SYSTEM LAB	
Sub Code: CS04PPC04	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To learn Unix commands and shell programming
2. To implement various CPU Scheduling Algorithms
3. To implement Process Creation and Inter Process Communication.
4. To implement Deadlock Avoidance and Deadlock Detection Algorithms
5. To implement Page Replacement Algorithms
6. To implement File Organization and File Allocation Strategies.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Basics of UNIX commands • Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir • Write C programs to simulate UNIX commands like cp, ls, grep, etc. • Shell Programming • Write C programs to implement the various CPU Scheduling Algorithms • Implementation of Semaphores • Implementation of Shared memory and IPC • Bankers Algorithm for Deadlock Avoidance • Implementation of Deadlock Detection Algorithm • Write C program to implement Threading and Synchronization Applications	18

LAB OUTCOMES: The students would have learnt

CO1: Compare the performance of various CPU Scheduling Algorithms
CO2: Implement Deadlock avoidance and Detection Algorithms
CO3: Implement Semaphores
CO4: Create processes and implement IPC
CO5: Analyze the performance of the various Page Replacement Algorithms
CO6: Implement File Organization and File Allocation Strategies

Text Books:

1. Operating System concepts, Milenkovic M., MGH
2. Operating System design and implementation, Tanenbaubm A. S., PHI
3. Operating system concepts, Silberschartz A.and Patterson J.I. ,Wisley.

Reference Books:

1. Operating System, Stilling William, Maxwell McMillan International Edition 1992.
2. An introduction to operating system, Dectel H.N., , Addision Wisley.

Sub Title: ELECTRONIC DEVICE & CIRCUITS LAB	
Sub Code: CS04PES06	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To identify and test various electronic components
2. To use DSO for various measurements
3. To plot the characteristics of diode and transistor
4. To design and implement feedback amplifier circuits.
5. To measure the frequency of oscillators.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• To draw the characteristics of a semiconductor p-n junction diode and to find cut-in voltage, reverse resistance, static resistance and dynamic resistance. • To design a half wave rectifier and to determine its efficiency and ripple factor. • To design a centre tap full wave rectifier and determine the ripple factor and efficiency. • To design a bridge full wave rectifier and determine the ripple factor and efficiency. • To draw the characteristics of CE configuration of a transistor amplifier. • To draw the characteristics of CB configuration of a transistor amplifier. • To draw the characteristics of CC configuration of a transistor amplifier. • To draw the characteristics of JFET (N-channel / P- Channel). • To draw the characteristics of MOSFET (Depletion Type / Enhancement Type). • To draw Static input and output characteristics curves of CE transistor and determine its h-parameter values. • To draw Static input and output characteristics curves of CC transistor and determine its h-parameter values.	18

| | • Study of various topologies of feedback amplifier.
• To Design Wein Bridge Oscillator and determine the frequency of Oscillation.
• To Design RC phase shift oscillator and determine the frequency of Oscillation. | |

LAB OUTCOMES: The students would have learnt

CO1: Understand the diode and transistor characteristics.
CO2: Verify the rectifier circuits using diodes and implement them using hardware.
CO3: Design various amplifiers like CE, CC, common source amplifiers and implement them using hardware and also observe their frequency responses
CO4: Understand the construction, operation and characteristics of JFET and MOSFET, which can be used in the design of amplifiers.
CO5: Know the concept of feedback amplifier and their characteristics
CO6: Design the different oscillator circuits for various frequencies

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Text Books:

1. Lab Manual of Basic Electronics by Paul B Zbar, TMH
2. Laboratory Manual for Electronic Devices and Circuits, 4th Ed., David A. Bell, PHI
3. Electronic Devices and Circuit Theory, Robert L. Boylestad & L. Nashelsky, K. L. Kishore, 9th Edition, PHI
4. Integrated Electronics: Analog & Digital Circuit Systems, Jacob Millman & Halkias, Tata McGraw Hill.
5. Microelectronics, Millman and Grabel, Tata McGraw Hill.
6. Integrated Circuits by K. R. Botkar, 9th Ed., Khanna Publicationso

Reference Books:

1. Electronic Devices & Circuits, Allen Mottershead, PHI.
2. Microelectronic Circuits, Sedra and Smith, 5th Edition, Oxford University Press.
3. Operational Amplifiers by R. Gayekwad, 4th Ed., Pearson Education

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
THIRD YEAR, SEMESTER - V
W.E.F. SESSION 2020-21

Branch :- Computer Science & Engg. Year : III Sem- V

S. No.	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS05TES05	Microprocessor and Interfaces	3	0	0	30	70	100	3
2	CS05TPC08	Relational Data Base Management System	3	0	0	30	70	100	3
3	CS05TPC09	Formal Language and Automata Theory	3	0	0	30	70	100	3
4	CS05TPC10	Parallel Computing	3	0	0	30	70	100	3
5	CS05TPEX	Professional Elective-I	3	0	0	30	70	100	3
6	CS05TMC02	Constitution of India	3	0	0	0	0	0	0
	PRACTICAL								
1	CS05PPC05	Relational Data Base Management System Lab	0	0	3	30	20	50	1.5
2	CS05PPC06	Parallel Computing Lab	0	0	3	30	20	50	1.5
3	CS05PPR01	Minor Project- I	0	0	3	30	20	50	1.5
							Total		**19.5**

Professional Elective-I Subject V Sem.			
S. No.	Subject Code	Subject	Credits
1	CS05TPE01	Software Engineering	3
2	CS05TPE02	Information Theory & coding	3
3	CS05TPE03	Mobile Communication	3
4	CS05TPE04	Multimedia System Design	3

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
THIRD YEAR, SEMESTER - VI
W.E.F. SESSION 2020-21

Branch :- Computer Science & Engg.   **Year : III**   **Sem- VI**

S. No.	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS06TPC11	Design and Analysis of Algorithms	3	0	0	30	70	100	3
2	CS06TPC12	Java	3	0	0	30	70	100	3
3	CS06TPC13	Computer Graphics	3	0	0	30	70	100	3
4	CS06TPEX	Professional Elective-I	3	0	0	30	70	100	3
5	CS06TPEX	Professional Elective-II	3	0	0	30	70	100	3
6	CS06TOEX	Open Elective-I	3	0	0	30	70	100	3
	PRACTICAL								
1	CS06PPC07	Design and Analysis of Algorithms Lab	0	0	3	30	20	50	1.5
2	CS06PPC08	Java Lab	0	0	3	30	20	50	1.5
3	CS06PPR02	Minor Project-II	0	0	3	30	20	50	1.5
			Total						**22.5**

Professional Elective-I & II Subject VI Sem.				Open Elective-I Subject VI Sem.			
S.No	Subject Code	Subject	Credits	S.No.	Subject Code	Subject	Credits
1	CS06TPE05	Digital Image Processing	3	1	CS06TOE01	Management Information System	3
2	CS06TPE06	Robotics	3	2	CS06TOE02	E-Commerce	3
3	CS06TPE07	Artificial Intelligence	3	3	CS06TOE03	Human Resource Management	3
4	CS06TPE08	Software Testing and Quality Assurance	3	4	CS06TOE04	Business Intelligence	3

Sub Title: MICROPROCESSOR AND INTERFACES		
Sub Code: CS05TES05	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To describe the basic architecture of 8086.
2. To discuss the Instruction set of 8086.
3. Evaluate the different technique of interfacing with memory and IO devices.
4. Develop knowledge about interfacing devices and peripheral devices.
5. To describe the basic architecture of 80386 and co-processor.

UNIT No	Syllabus Content	No of Hours
1	Microprocessor Architecture -8086, Register organization of 8086, Signal descriptions of 8086 chip, Physical Memory organization, Introduction to Maximum and Minimum mode operation, Processor 8088.	8
2	Instruction formats, Addressing modes, Instruction Set of 8086: Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Shift and rotate instructions, String Manipulation instructions, Machine Control Instruction, Flag Manipulation Instruction, Assembler Directive and Operators Programming with an Assembler, Programming examples.	7
3	Introduction to Stack, Stack Structure of 8086, Interrupt, Interrupt and Interrupt Service Routines, Non Maskable Interrupt, Maskable Interrupt. Subroutine, MACROS: Defining a MACRO, Passing Parameters to MACRO.	7
4	Memory Interfacing, Interfacing I/O Ports, Programmable Interval Timer 8253: Architecture and Signal Description, Operating modes, Programming and Interfacing 8253, DMA Controller 8257: Architecture and Signal Description, Keyboard/Display Controller 8279: Architecture and Signal Description, Mode of Operation, Floppy Disk Controller 8272: Architecture and Signal Description, Commands.	7
5	Multi microprocessor System: Numeric Processor 8087, IO Processor 8089. 80386: Features, Architecture and Signal Description, Register Organization, Real Mode, Protected Mode, Virtual Mode, Paging, Segmentation.	7

COURSE OUTCOMES: The students would have learnt

CO1: Learn about the basic architecture of 8086.
CO2: Develop a skill to do Assembly Language Programming.
CO3: Learn to do interfacing with memory and IO devices.
CO4: Develop a understanding about the peripheral devices.
CO5: Learn about the basic of 80386 microprocessor and co-processor

Text Books:

1. Advanced Microprocessors and Peripherals – Architecture, Processing and Interfacing :A.K.Ray, K.M. Bhurchandi
2. Microcomputer System 8086/8088 Family – Architecture Programming and design : Y Liu and G. A. Gibson : Prentice Hall
3. 80386 Microprocessor Handbook C.H. Pappas and W. H. Murray :Osborne McGraw Hill

Reference Books:

1. Microprocessor Architecture Programming and Application: R.C. Gaonkar : Wiley Eastern.
2. Microprocessor8086 , 80386& Pentium , Barry B. Brey

Sub Title: Relational Data Base Management System		
Sub Code: CS05TPC08	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To describe a sound introduction to the discipline of database management systems.
2. To give a good formal foundation on the relational model of data and usage of Relational Algebra.
3. To introduce the concepts of basic SQL as a universal Database language.
4. To enhance knowledge to advanced SQL topics like embedded SQL, procedures connectivity through JDBC.
5. To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure. Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.	8
2	**Relational Data Model And Language:** Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus, Introduction to SQL: Characteristics of SQL. Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.	7
3	**Data Base Design & Normalization:** Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.	7
4	**Transaction Processing Concepts:** Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.	7
5	**Concurrency Control Techniques:** Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction.	7

COURSE OUTCOMES: The students would have learnt

CO1: Explain the features of database management systems and Relational database.
CO2: Design conceptual models of a database using ER modeling for real life applications and construct queries in Relational Algebra.
CO3: Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.
CO4: Retrieve any type of information from a database by formulating complex queries in SQL.
CO5: Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.

Text Books:

1. Date C J, "An Introduction To Database System", Addision Wesley
2. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
3. Elmasri, Navathe, "Fundamentals Of Database Systems", Addision Wesley
4. Leon & Leon, "Database Management System", Vikas Publishing House.

Reference Books:

1. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
2. Majumdar & Bhattacharya, "Database Management System", TMH
3. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill
4. Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson Education.
5. Maheshwari Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi

Sub Title: FORMAL LANGUAGE AND AUTOMATA THEORY		
Sub Code: CS05TPC09	**No. of Credits : =3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. To learn fundamentals of Regular and Context Free Grammars and Languages
2. To understand the relation between Regular Language and Finite Automata and machines.
3. To learn how to design Automata's and machines as Acceptors, Verifiers and Translators.
4. To understand the relation between Contexts free Languages, PDA and TM.
5. To learn how to design PDA as acceptor and TM as Calculators.
6. To learn how to correlate Automata's with Programs and Functions.

UNIT No	Syllabus Content	No of Hours
1	**Finite Automata & Regular Expression:** Deterministic and Non-deterministic Finite automata, Regular Expression, Two way finite automata, Finite automata with output, Properties of regular set, Pumping lemma, Closure properties	8
2	**Context Free Grammars (CFG):** Introduction of CFG, Derivation trees, Simplification of normal forms, CNF, GNF, Regular Grammars, Unrestricted Grammars and Relations between Classes of languages.	7
3	**Push Down Automata:** Introduction of PDA, Definitions relationship between PDA and Context Free Languages, properties of CGL's, Decision Algorithms.	7
4	**Turing Machine:** The Turing machine model, Computable languages and functions, Modification of Turing machines, Church's Hypothesis	7
5	**Recursive and Recursive Enumerable Languages:** Properties of recursive and recursive enumerable languages Universal Turing machine, Undesirability Post correspondence problem, Introduction to Recursive function theory.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand, design, construct, analyze and interpret Regular languages, Expression and Grammars.
CO2: Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.
CO3: Understand, design, analyze and interpret Context Free languages, Expression and Grammars
CO4: Design different types of Push down Automata as Simple Parser.
CO5: Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine.

Text Books:

1. Introduction to Automata Theory Languages and Computation, Hopcroft and Ullman, Narosa.
2. Theory of Computer Science, Mishra and Chandrashekharan, PHI.

Reference Books:

1. Theory of Computer Science, Kohan, John Wiley.
2. Theory of Computer Science, Korral
3. Introduction to Automata Theory Languages and Computation, Hopcroft and Ullman, Addison Wesley
4. Introduction to Languages & Theory of Computation, Martin, , TMH

Sub Title: PARALLEL COMPUTING		
Sub Code: CS05TPC10	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To introduce parallel, distributed and cloud computing, the major concept, ideas and various hardware model of parallel and distributed system.
2. To study design the multiprocessor system by various interconnection network like static and dynamic etc.
3. To study various technique for vector pipeline architecture design to achieve parallelism (concurrency)
4. To study about advanced and more power full processor technology
5. To study about parallel algorithm design, programming language and tools like Python, CUDA. To study about architecture design of GPU.

UNIT No	Syllabus Content	No of Hours
1	**Introduction Of Parallelism:** Introduction -parallelism in Uniprocessor systems, Principles of Scalable Performance, architectural classification schemes, SISD, SIMD, MISD, MIMD architectures, multiprocessor and multicomputer, UMA, NUMA, COMA, NORMA model Parallel algorithms: Various Soritng	8
2	**Parallel Models & Interconnection Network:** System Interconnect architecture – static, dynamic, multistage interconnection networks, design considerations throughputs, delay, blocking and non-blocking properties interconnected memory organization - C-Access, S-Access, C-S access.	7
3	**Pipeline & Vector Processing:** Principal of Pipelining - Over lapped parallelism, principal of Liner pipelining processor, General pipelining and reservation tables, arithmetic pipelining, Design of pipeline Instruction units, arithmetic pipelining design example, hazard detection and resolution, JOB sequencing and collision prevention, vector processing function organization of instructions in IBM 360/91.	7
4	**Advanced Processor and Parallelism:** Advanced processor technology – RISC & CISC computers, super scalar architecture, principles of multithreading, multithreaded architectures of MP systems. Context switching policies, shared variables, locks, semaphores, monitor, multitasking and Cray multiprocessor.	7

5	**Parallel Programming Design Coding And Dubugging:** CPU parallelism, GPU parallelism- program, Exploiting parallelism in programmed-multidimensional arrays, directed acyclic graphs, distance and direction vectors, data flow computer and data flow graphs. Parallel algorithm structure, analyzing parallel algorithm. Elementary parallel algorithms, Programming: Parallel programming with Synchronous and Asynchronous, Various API of MPS, PYTHON, CUDA, OpenCL.	7

COURSE OUTCOMES: The students would have learnt

CO1: Spontaneously able to design the multiprocessor system with various hardware electronics circuit like CU, ALU, RAM etc.

CO2: Design new interconnection network which connects the processors and other devices like input and output devices (I/O)

CO3: Spontaneously try and invented a new type of pipeline processor architecture in which throughput can be as better as possible than all other.

CO4: How do combine the techniques of parallelism to obtain a more power full architecture as a outcome.

CO5: Course outcomes are skills and abilities to make parallel algorithm and program to enhance the speed up of execution of process.

Text Books:

1. Computer Architecture & Parallel processing - Kai Hwang 7 Briggs.(MGH).
2. Advanced Computer Architecture with Parallel Programming", K. Hwang, MGH.
3. Quinn, Parallel computing – theory and practice, Tata McGraw Hill.
4. Sima and Fountain, Advanced Computer Architectures, Pearson Education
5. Ed. Afonso Ferreira and Jose′ D. P. Rolin, Parallel Algorithms for irregular problems - State of the art, Kluwer Academic Publishers

Reference Books:

1. Parallel Computers: Arch.& Prog., Rajaraman & Siva Ram Murthy, PHI.
2. Parallel computing- Theory and practice - Michael J Quinn- Mc Graw Hill
3. Selim G. Akl, The Design and Analysis of Parallel Algorithms, PH International.

Sub Title: SOFTWARE ENGINEERING		
Sub Code: CS05TPE01	No. of Credits :3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To discuss the fundamental concepts of Software Engineering.
2. To discuss the Various Models of Software.
3. Acquire skills and knowledge to advance their career, including continually upgrading professional, communication, analytic, and technical skills.
4. To Learn the ability to work effectively as a team member and/or leader in an ever-changing professional environment
5. Learn to develop a small Software.

UNIT No	Syllabus Content	No of Hours
1	**Software Engineering:** What is software, Evolution of Software, Characteristics of software, Types of Software, Applications of software, Layered Technology , **Software Process Models:** Linear Sequential model, Prototype model, RAD model, Incremental model, Spiral Model, Component Based Development Model.	8
2	**Managing Software Project** **The Management Spectrum:** People, Product, Process, Project. Software Process and Project Metrics – Measures and Metrics , Software Measurement-Size Oriented Metrics, Function Oriented Metrics, Metrics for Quality-Overview, Measuring Quality, DRE. Software Requirement Specification-Problem Analysis, Requirement Specification. Validation and verification, The Make /Buy Decision.	7
3	**System Design:** Introduction, design principles, Problem partitioning, abstraction, top-down and bottom-up design, Low level Design:-Modularization, Structure Chart, Flow chart, Functional versus Object oriented approach, design specification, Design verification, monitoring and control.	7

4	**Coding:** Top–down and bottom-up structured programming, information hiding, programming style, internal documentation, verification, monitoring and control. **Software testing:** Software Testing fundamentals, white box testing, Basis path testing, Cyclomatic Complexity, A strategic Issues, Unit testing, Integration testing, validation testing, System Testing.	7
5	**Software Project Management:** Cost estimation, project scheduling, Software configuration management, Quality assurance, Project Monitoring, Risk management.	7

COURSE OUTCOMES: The students would have learnt

CO1: The Fundamentals Of Software Engineering
CO2: How to apply the software engineering lifecycle
CO3: Understand of different software architectural styles and Process frame work.
CO4: Describe software measurement and software risks.
CO5: To Develop a Project.

Text Books:

1. Software Engg by Bharat bhushan agrawal, Sumit Prakash Tayal,

Reference Books:

1. Software Engg by Pressmen
2. Software Engg by Pankaj Jalote
3. Software Project Management by Manish Kumar Jha.

Sub Title: INFORMATION THEORY & CODING		
Sub Code: CS05TPE02	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. Introduce the principles and applications of information theory.
2. To teach study how information is measured in terms of probability and entropy, and the relationships among conditional and joint entropies.
3. To teach coding schemes, including error correcting codes.
4. Explain how this quantitative measure of information may be used in order to build efficient solutions to multitudinous engineering problem

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Uncertainty, properties of information, Measures of information, Entropy: properties of entropy, information rate, conditional Entropy, Mutual Information.	8
2	**Channel Capacity:** Introduction, Shannon's Theorem, Continuous Channel, Capacity of Gaussian Channel: Shannon Hartley Theorem Bandwidth and S/N Trade-off.	7
3	**Channel Coding:** Introduction, Shannon-Fano Coding, Huffman Coding, Block Codes, Tree Codes, Cyclic Code, Hamming Codes, Convolutional Code.	7
4	**Compression:** Introduction, Types of Compression, Lossless and Lossy Compression, Binary Image Compression Schemes: Runlength Encoding, CCITT Groups, Video Compression.	7
5	**Cryptography:**Introduction, Types of Cryptosystem: Secret-key cryptosystem, Public-key cryptosystem, Encryption, Decryption, Ciphers and Secret Message, Cryptanalysis.	7

COURSE OUTCOMES: The students would have learnt

CO1: Apply information theory in source coding and channel coding
CO2: Understand how error control coding techniques are applied in communication systems.
CO3: Understand linear block codes for error detection and correction
CO4: Understand various error control encoding and decoding techniques
CO5: Students will understand the basic concepts of cryptography.

Text Books:

1. Information Theory, Coding and Cryptography by Ranjan Bose, Tata McGraw-Hill Education.
2. Communication System by R. P. Singh, S. D. Sapre, Tata McGraw-Hill.
3. Information Theory and Coding Techniques by J.S. Chitode and P.G. Chilveri, Technical Publication.

Reference Books:

1. Elements of Information Theory" byT. M. Cover and J. A. Thomas, John Wiley & Sons, New York.
2. Information Theory, Coding and Cryptography" by R. Bose, TMH.

Sub Title: MOBILE COMMUNICATION		
Sub Code: CS05TPE03	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Discuss the evolution of Mobile communication and cell concept to improve capacity of the system.
2. Discuss the radio transmission of Mobile communication.
3. Discuss the concept of GSM, DECT and TETRA.
4. To know about infrastructure and infrastructure less network.
5. Discuss the concept of mobility i.e. Mobile IP and TCP

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Applications : Vehicles, Emergencies, Business, Replacement of wired networks, Infotainment, Location dependent services. Mobile and wireless devices, history of wireless communication, Reference Model.	8
2	**Wireless Transmission:** Frequencies For Radio Transmission, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular System Medium Access Control Hidden And Exposed Terminals, Near And Far Terminals, SDMA, FDMA,TDMS, CDMA, Comparison Among Multiple Access Protocols.	7
3	**Telecommunications Systems:** Gsm: Mobile Services, System Architecture, Radio Interface, Protocols, Localization And Calling, Handover, Security, New Data Services. Dect, Tetra	7
4	**Wireless Lan:** Infrared vs radio transmission, Infrastructure and ad-hoc network, **IEEE 802.11:** System architecture, protocol architecture, Physical layer, Medium access control layer, MAC management, 802.11b, 802.11a, Newer developments, HIPERLAN, Bluetooth.	7
5	**Mobile Communication Layers:** Mobile network layer: Mobile IP, Goals, assumptions and requirements, Entities and terminology, IP packet delivery, Agent discovery, Registration, Tunneling and encapsulation, Optimizations, Reverse tunneling, IPv6. DHCP, Mobile Ad-hoc Routing, Mobile TCP, File System	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the evolution of Wireless communication.
CO2: Understand the concept of cellular system.
CO3: Understand the working of GSM.
CO4: Understand the infrastructure less network like Bluetooth.
CO5: Understand the concept of Mobility in mobile communication.

Text Books:

1. Mobile Communications by J. Schiller, Addison Wesley
2. Mobile IP by Charles Perkins, Addison Wesley.

Reference Books:

1. Ad hoc Networks by Charles Perkins, Addison Wesley.
2. Understanding WAP by M. V. D. Heijden, M. Taylor, Artech House.

Sub Title: MULTIMEDIA SYSTEM DESIGN		
Sub Code: CS05TPE04	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Understand technical aspect of Multimedia Systems.
2. Discuss the standards available for different audio, video and text applications.
3. Understand organization of multimedia database.
4. Discuss various multimedia authoring systems.
5. To develop multimedia application and analyse the performance of the same

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** An introduction, Multimedia elements, Multimedia Applications, Multimedia System Architecture, Evolving Technologies for Multimedia Systems, Defining Objects for Multimedia systems, Multimedia Data Interface Standard, The need for data Compression, Multimedia databases.	8
2	**Compression Techniques:** Compression and Decompression, Types of compression, Binary Image Compression schemes, Color, Gray Scale, Still-video image Compression, Video Image Compression, Audio Compression, Fractal Compression.	7
3	**Formats**: Data and Format Standards, Rich-text Format, TIFF File Format, Resource Interchange File Format (RIFF), MIDI File Format, JPEG DIB File Format for still and Motion Images, MPEG standards Pen Input, Video and Image Display systems, Print Output Technologies, Image Scanners, Digital Voice and Audio, Digital Camera, Video Images and Animation, Full-Motion Video.	7
4	**Storage:** Storage and Retrieval Technologies, Magnetic Media Technology, Optical Media, Hierarchical Storage Management, Cache management for storage systems, Multimedia Application Design, Multimedia application classes, Types of multimedia systems, Components of multimedia systems, Organizing multimedia databases.	7

5	**Multimedia Design:** Unified Communication, video conferencing and Chat, Multimedia Authoring and User Interface, Multimedia authoring system, Hypermedia application design consideration, User interface design, Object display/playback issues, Multimedia Operating Systems introduction, real time, Resource management, process management, file systems.	7

COURSE OUTCOMES: The students would have learnt

CO1: Various technical aspect of Multimedia Systems.
CO2: Various file formats for audio, video and text media.
CO3: Develop various Multimedia Systems applicable in real time.
CO4: Concept of storage management of multimedia system.
CO5: To evaluate multimedia application for its optimum performance

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Text Books:

1. Multimedia System Design by Prabhat K. Andleigh & Kiran Thakrar, Prentice PTR, NJ.
2. Multimedia: computing communications and applications by Ralf Steinmetz and Klara Nahrstedt, Innovating technology series by Pearson Edu. Asia.

Reference Books:

1. Multimedia Communications, Directions & Innovations by Jerry D.Gibson, Harcourt India Pvt.Ltd.
2. Multimedia computing by Borko, Handbook of CRC Press.
3. Multimedia Applications Development by Mark J.Bunzel Sandra K.Morris, McGraw Hill.
4. Fundamentals of Multimedia by Ze-Nian Li, Mark S.Drew, by Pearson Edu. Asia

Sub Title: CONSTITUTION OF INDIA		
Sub Code: CS05TMC02	No. of Credits : 0=0: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To Enable the student to understand the importance of constitution
2. To understand the structure of executive, legislature and judiciary
3. To understand philosophy of fundamental rights and duties
4. To understand the autonomous nature of constitutional bodies like Supreme Court and high court, controller and auditor general of India and election commission of India.
5. To understand the central and state relation, financial and administrative.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Constitution – meaning of the term, Sources and constitutional theory, Features, Citizenship, Preamble	8
2	**Fundamental Rights and Duties:** Fundamental Rights, Fundamental Duties, Directive Principles of State Policy	7
3	**Union Government: Structure of Indian Union**: Federalism, Centre-State relationship, President: Role, power and position, Prime Minister and council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha	7
4	**State Government**: Governor: Role and position, Chief Minister and council of ministers, State Secretariat	7
5	**Relationship between Centre and States:** Distribution of Legisltive Powers, Administrative Relations, Coordination between States	7

COURSE OUTCOMES: The students would have learnt

CO1: Able to understand historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administration

CO2: Able to apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

CO3: Able to analyze the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government

CO4: Able to evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions of viz SC/ST/OBC and women.

Text Books:
1. Constitution of India, V.N. Shukla
2. The Constitutional Law of India, J.N. Pandey

Reference Books:
1. Indian Constitutional Law, M.P. Jain

Sub Title: **RELATIONAL DATA BASE MANAGEMENT SYSTEM LAB**	
Sub Code: **CS05PPC05**	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	**IA+ESE =30+20**

Lab OBJECTIVE:

1. To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools.
2. To familiarise the participant with the nuances of database environments towards an information-oriented data-processing oriented framework
3. To give a good formal foundation on the relational model of data
4. To present SQL and procedural interfaces to SQL comprehensively
5. To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Write the queries for Data Manipulation and Data Definition Language. • Write SQL queries using logical operations and operators. • Write SQL query using group by function. • Write SQL queries for group functions. • Write SQL queries for sub queries, nested queries. • Write programme by the use of PL/SQL. • Write SQL queries to create views. • Write an SQL query to implement JOINS. • Write a query for extracting data from more than one table. • Write a query to understand the concepts for ROLL BACK, COMMIT & CHECK POINTS.	18

LAB OUTCOMES: The students would have learnt

CO1: Understand, appreciate and effectively explain the underlying concepts of database technologies
CO2: Design and implement a database schema for a given problem-domain Normalize a database
CO3: Populate and query a database using SQL DML/DDL commands.
CO4: Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
CO5: Programming PL/SQL including stored procedures, stored functions, cursors, packages.

Text Books:

1. An Introduction to Database System, Date C J, Addision Wesley
2. Database Concepts, Korth, Silbertz, Sudarshan, McGraw Hill
3. Fundamentals of Database Systems, Elmasri, Navathe, Addision Wesley
4. Database Management System, Leon & Leon, Vikas Publishing House.

Reference Books:

1. An introduction to Database Systems, Bipin C. Desai, Galgotia Publication
2. Database Management System, Majumdar & Bhattacharya, TMH
3. Database Management System, Ramakrishnan, Gehrke, McGraw Hill
4. Database Processing: Fundamentals, Design and Implementation, Kroenke, Pearson Education.
5. DBMS: Complete Practical Approach, Maheshwari Jain, Firewall Media, New Delhi

Sub Title: PARALLEL COMPUTING LAB	
Sub Code: CS05PPC06	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To study about various platform and libraries of parallel processing.
2. To study about to create MPI programs to accomplish a computational task
3. To study about of API to carried out MPI
4. To study about to know GPU importance in parallel programming
5. To study about of shared memory in parallel

Unit No.	Content	Teaching Hours
I, II, III, IV and V	- Understanding the environment of OMP, MPI, CUDA - Parallel programming environment and platform. - Create and simulate multiple processes and threads on MP system. - Simulate parallel program to synchronization and pooling of processes. - Simulate the loop and function in parallelism manner. - Simulate a parallel algorithm to perform some mathematical calculation and their execution time. - Simulate the parallel sorting algorithm and their execution time. - Simulate the parallel searching algorithm and their execution time. - Simulate parallel some operation on array and list with their execution time. - Optimization technique using shared memory module on MP system. - Heterogeneous calculation using PYTHON (PTK), CUDA, and OPENCL tool kit.	18

LAB OUTCOMES: The students would have learnt

CO1: Simulate and create process and threads
CO2: Simulate parallel algorithm using various MPI
CO3: Simulate parallel program for many computational task
CO4: Simulate various memories to carry out optimization.
CO5: Do synchronous and asynchronous of process and pooling.

Text Books:

1. Programming Massively Parallel Processors: A Hands-on Approach Paperback – 20 December 2012 by David B. Kirk , Wen-mei W. Hwu
2. Introduction to Parallel Algorithms 1st Edition by Joseph JaJa.

Reference Books:

1. Python Parallel Programming Cookbook Paperback – August 26, 2015 by Giancarlo Zaccone

Sub Title: DESIGN AND ANALYSIS OF ALGORITHMS		
Sub Code: CS06TPC11	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To Analysis efficiency of algorithms on the basis of their time complexity and space complexity by mathematically foundation (asymptotic notation)
2. To study about design and analysis of divide and conquer and greedy algorithm on the basis of their attributes and also describe when could be used these technique and which situation for which problem
3. To know dynamic programming(DP) paradigm and algorithm for problems on the different data structure like graph and array
4. Know a branch and bound technique and backtracking technique for problems
5. Know the classes of problems like P,NP on their basis of nature (running time complexity)

UNIT No	Syllabus Content	No of Hours
1	**Algorithms Analysis:** Space and Time Complexity, Asymptotic Notations, mathematical foundations: growth functions, complexity analysis of algorithms, Recursive algorithms, analysis of no-recursive and recursive algorithms, Recurrences equation and their solution. Master method, recursive tree and backward substitution method.	8
2	**Divide & Conquer and Greedy Method:** Divide and conquer-Finding Maxima and Minima Binary search, Merge Sort, Quick Sort, and selection sort. Stassen's Matrix multiplication Greedy method-introduction, Knapsack problem, travelling sales person problem, Minimum Spanning trees- kruskal's algorithm, prim's algorithm, Single source shortest path-Dijkstra's algorithm, Huffman codes.	7
3	**Dynamic Programming and Search Techniques:** Dynamic Programming: Introduction, Matrix chain multiplication, Single source shortest path-Bellman-Ford, all pairs shortest path, optimal binary search tree, o/1 knapsack problem, travelling sales person problem, longest common subsequence Search techniques: Techniques for binary trees, techniques for graphs –DES and BFS, connected components, Bi-connected components, and Strongly-connected components, Topological sorting. **Heap Data Structure:** Min and Max Heap, Fibonacci Heap, Binomial heap, Amortized Analysis, Heap sort.	7

4	**Back Tracking and Branch and Bound:** Backtracking: Back tracking and Recursive back tracking, applications of back tracking paradigm, the 8-queen problem, graph coloring, Hamiltonian cycles. **Branch and Bound:** introduction, 0/1 knapsack problem, travelling sales person problem, Least Cost (LC) search – the 15-puzzle problem.	7
5	**Complexity Class Theory and Pattern Matching :** Problem classes, Optimization problem, decision making problem, P VS NP VS NPC VS NPH,Venn diagram and their analysis, deterministic and non-deterministic polynomial time algorithm, Cook Levin theorem, Verification algorithms for some NP Class: subset sum problem, clique problem, vertex cover, independent set problem, Circuit Satisfiability problem, 2-SAT, 3-SAT etc. Pattern matching: Basic concept of pattern reorganization and their algorithms.	7

COURSE OUTCOMES: The students would have learnt

CO1: Technique to calculate and obtain the running time complexity and space complexity of any kind of algorithm.

CO2: Design divide and conquer and greedy algorithm for problems and at the same time they will able to know that which data structure are adequate to enhance the running time complexity.

CO3: Spontaneously able to described and analyze the dynamic-programming (DP) algorithm moreover when an algorithmic design situation calls for it and can construct a new DP algorithm for given a particular problem.

CO4: Spontaneously able to construct and design branch & bound and backtracking algorithm for a particular problem on the basis of the problem nature analysis and requirement.

CO5: Analyzed and write verification algorithm for some NP and NPH class problems.

Text Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, Clifford Stein, "Introduction to Algorithm" ,Publisher PHI. ISBN 81-203-2141-3
2. Sanjoy Dasgupta, Christos H. Papadimitriou and Umesh V. Vazirani, Algorithms, Tata McGraw-Hill, 2008
3. Jon Kleinberg and Éva Tardos, Algorithm Design, Pearson, 2005.
4. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Interne Examples, Second Edition, Wiley, 2006.

Reference Books:

1. Udi Manber, Algorithms – A Creative Approach, Addison-Wesley, Reading, MA, 1989.
2. Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1997

Sub Title: JAVA		
Sub Code: CS06TPC12	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To discuss the fundamental concepts of OOPs and Java
2. To discuss the Differences between C/C++ and Java.
3. Knowledge of Multithreading, Packages and Applet.
4. Use of Java on different Platform.
5. Learn to develop a small project using Java

UNIT No	Syllabus Content	No of Hours
1	**Java Fundamentals:** Basic Concepts of Object-Oriented Programming, Java History, Java Features, How Java Differs from C and C++, Web Browsers, Java Environment, Java Program Structure, Java Tokens, Installing and Configuring Java, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style.	8
2	Constants, Variables and Data Types, Declaration of Variables, Giving values to variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values, Java Operators, Arithmetic Expression, Evaluation of Expressions, Precedence of Arithmetic Operators, Operator Precedence and Associativity, Mathematical Functions, Control Statements (if statement, switch statement and Conditional operator statement), Decision Making and Looping (while construct, do construct, for construct), Jumps in Loops.	7
3	**Class,Objects and Methods:** Introduction of Class, Defining a Class, Fields Declaration, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, **Inheritance:** Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Abstract Methods and Classes, Visibility Control **Introduction of Array:** One Dimensional Array, Creating an array, Two-Dimensional arrays, Strings, Wrapper Classes. **Interfaces:** Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables, **Packages:** Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes, Static Import.	7

4	**Introduction to Multithreaded Programming:** Difference between Multithreading and Multitasking, Creating threads, Extending the thread class, Stopping and Blocking a thread, Life Cycle of a thread, Using thread Methods, Thread Exception, Thread Priority, Synchronization, Implementing the Runnable Interface, Inter-thread Communication. Managing Errors and Exceptions: Types of Errors, Exceptions, Syntax of	7
5	Introduction of Applet Programming, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML file, Running the Applet, Passing Parameters to Applets, Aligning the Display, Displaying Numeric values, Getting input from the user, Event handling, Introduction of Graphics Programming, Introduction to AWT package, **Managing Input/Output Files in Java:** Concept of Streams, Stream Classes, Byte Stream Classes, Character Stream Classes, Other useful I/O classes, Using the file class, Input/Output exceptions.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understanding of basic concept of Java Programming
CO2:   Knowledge of the structure of Java.
CO3: The Concept of Exception Handling, Package and Applet
CO4: To use the Java programming language for various programming technologies (understanding)
CO5: To develop a software in the Java programming language.

Text Books:

1. E.Balagurusamy, Programming with Java A Primer, Fourth Edition, McGrawHill, 2010.

Reference Books:

1. H.Schildt, Java TM 2: The Complete Reference, Fourth Edition, Tata McGrawHill, 2001.
2. K. A. Mughal and R. W. Rasmussen, A Programmer's Guide to Java TM SCJP
3. Certification A Comprehensive Primer, Third Edition, Addison Wesley, 2008.

Sub Title: COMPUTER GRAPHICS		
Sub Code: CS06TPC13	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
2. To learn the basic principles of 3-dimensional computer graphics.
3. Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
4. Provide an understanding of mapping from a world co-ordinates to device coordinates, clipping, and projections.
5. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.
6. To comprehend and analyze the fundamentals of animation, virtual reality, underlying technologies, principles, and applications.

UNIT No	Syllabus Content	No of Hours
1	Line Generation Points, lines, Plaines Vector, pixels and frame buffers, Vector and character generation. Graphics Primitives, Display devices, Primitive operation, Display- file structure, Display control text.	8
2	**Polygons:** Polygons representation, Entering polygons, Filling Polygons. Transformation: Matrices of 2D Transformation, transformation routines Display procedures.	7
3	**Segments:** Segments table, Creating Deleting and renaming a segment Visibility, Image transformation. **Windowing and Clipping:** Viewing transforming, Clipping, Generalized clipping, multiple windowing.	7
4	**Three Dimensions:** 3-D Geometry Primitives, Transformation, Projection, Clipping, Hidden line and Surfaces Back-face Removal Algorithms, Hidden line methods.	7
5	**Rendering and Illumination:** Introduction to curve generation. Bezier. Hermit and B-spline algorithms and their comparisons. .	7

COURSE OUTCOMES: The students would have learnt

CO1: To list the basic concepts used in computer graphics.
CO2: To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
CO3: To describe the importance of viewing and projections.
CO4: To define the fundamentals of animation, virtual reality and its related technologies.
CO5: To understand a typical graphics pipeline
CO6: To design an application with the principles of virtual reality

Text Books:

1. Hearn Baker, "Computer Graphics", PHI.
2. Rogers , "Procedural Elements of Computer Graphics ", McGraw- Hill.
3. Newman & Sproulle , "Principles of Interacive Computer Graphics", MGH 1987.

Reference Books:

1. Harringtons S. , "Computer Graphics , " A Programming Approach Second Edition MGH 1987.
2. Rogers & Adams ," Mathematical Elements of Computers Graphics", Second Edition MGH.
3. Henary Baper , "Computer Graphics"

Sub Title: DIGITAL IMAGE PROCESSING		
Sub Code: CS06TPE05	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To discuss the fundamental concepts of digital image processing
2. To discuss the various image transform with respect to basic functions, properties and application.
3. To discuss image enhancement technique in spatial and frequency domain.
4. To discuss image segmentation and restoration technique in spatial and frequency domain.
5. To discuss the simple image processing technique.

UNIT No	Syllabus Content	No of Hours
1	**Digital Image Fundamentals:** Background, digital image representation, examples of field that use DIP, fundamental steps in digital image processing, Simple image model, basic relationships between pixels: neighborhood of a pixel, Connectivity, Basic transformations: translational, rotational, scaling. Color models and transformations, Pseudo color Image Processing.	8
2	**Image Transforms:** Introduction to 2D Transforms: Fourier Transform and Properties, DCT and Properties, Hadmard Tranformand Properties,WHT and properties **Image Compression:** Fundamentals, image compression models, elements of Information theory, Image Compression: lossy and non lossy compression, image compression standards.	7
3	**Image Enhancement Spatial Domain:** Background, Basic gray level transformations, histogram: Computation histogram , histogram specification, histogram equalization, enhancement using arithmetic/logic operations, basics of spatial filtering, smoothing sharpening spatial filters, combining spatial enhancement methods. **Edge Detection Methods:** Prewit, Sobeland Robert **Frequency Domain:** Background, introduction to the frequency domain, smoothing and sharpening frequency domain filters, homomorphic filtering, generation of spatial masks from frequency domain specifications.	7
4	**Image Segmentation:** Detection of discontinuities, edge linking & boundary detection, thresholding, Region based segmentation, morphological water sheds, the use of motion in segmentation	7

5	**Image Restoration :** Degradation model, Noise models, restoration in the presence of noise only (Spatial and frequency domain filters),Inverse filtering, LMS filtering, Wiener filter, constrained least square restoration, interactive restoration, restoration in the spatial domain	7

COURSE OUTCOMES: The students would have learnt

CO1: Understanding of basic image processing techniques. CO2:Image analysis using 2-D image transforms

CO2: Image enhancement technique in spatial and frequency domain

CO3: Image processing application such as compression, segmentation and restoration.

CO4: Learn to apply different image processing technique.

Text Books:

1. Digital Image Processing, R C Gonzalez & R E Woods, PearsonEducation,3 edition.
2. Digital Image Processing and Computer Vision, Milan Sonka, Cengagelearning, Firstedition.

Reference Books:

1. Digital Image Processing, S.Jayaraman,S.Esakkirajan, T.Veerakumar, Tata McgrawHill,2009.
2. Fundamentals of Digital Image processing, A K Jain, PHI/PearsonEducation,1989.
3. Digital Image Processing, Sid Ahmed, McGraw Hill.

Sub Title: ROBOTICS		
Sub Code: CS06TPE06	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Learn the basic concepts of Robots.
2. Learn the concepts of Kinematics of Robotics.
3. Learn the concepts of Motions, velocities and dynamic analysis of force.
4. Learn the concepts of Motion and Trajectory planning.
5. Learn the concepts of Potential Functions, Visibility Graphs and Coverage Planning.

UNIT No	Syllabus Content	No of Hours
1	Introduction to Robotics Evolution of robots and robotics, progressive advancement in robots, definitions and classifications, laws of robotics, robot anatomy and related attributes, human arm characteristics, robot control system, manipulation and control, sensors in robotics, robots programming, the future prospects.	8
2	10 Coordinate Frames, Mapping and Transforms Robot specification and notations, Coordinate frames, description of objects in space, transformation of vectors, inverting a homogeneous transform, fundamental rotation matrices, yaw pitch and roll, yaw pitch and roll transformation, equivalent angle.	7
3	Symbolic Modelling of Robots – Direct Kinematic Model Mechanical structure and notations, description of links and joints, kinematic modelling of the manipulator, Denavit – Hartenberg notation, kinematic relationship between adjacent links,manipulator, transformation matrix, introduction to inverse kinematic model, Artificial Intelligence in robotics.	7
4	Robotic Sensors and Vision The meaning of sensing, sensors in robotics, kinds of sensors used in robotics, robotic vision, industrial applications of vision-controlled robotic systems, process of imaging, architecture of robotic vision systems, image acquisition, description of other components of vision system, image representation, image processing.	7
5	Robot Applications Industrial applications, material handling, processing applications, assembly applications, inspection, application, principles for robot application and application planning, justification of robots, robot safety, non-industrial applications, robotic application for sustainable development & social issues.	7

COURSE OUTCOMES: The students would have learnt

CO1: Apply the basic concepts of Robots.
CO2: Apply and evaluate the concepts of Kinematics of Robotics.
CO3: Apply the Motions, velocities and dynamic analysis of force.
CO4: Apply and evaluate Motion and Trajectory planning.
CO5: Apply the concepts of Potential Functions, Visibility Graphs and Coverage Planning.

Text Books:

1. Robotics & Control – R.K. Mittal & I.J. Nagrath – TMH Publications
2. Robotics for engineers –Yoram Korean- McGrew Hill Co.
3. Industrial Robotics Technology programming and Applications –M.P.Groover, M.Weiss,
4. Robotics Control Sensing, Vision and Intelligence –K.S.Fu, R.C.Gonzalex, C.S.G.Lee-McGrew Hill Book co.

Reference Books:

1. Kinematics and Synthesis of linkages –Hartenberg and Denavit– McGrew Hill Book Co
2. Kinematics and Linkage Design – A.S. Hall – Prentice Hall
3. Kinematics and Dynamics of Machinary–J.Hirchhorn– McGrew HillBook Company

Sub Title: ARTIFICIAL INTELLIGENCE		
Sub Code: CS06TPE07	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To create appreciation and understanding of both the achievements of AI and the theory underlying those achievements.
2. To introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems
3. To review the different stages of development of the AI field from human like behavior to Rational Agents.

UNIT No	Syllabus Content	No of Hours
1	Introduction of Artificial Intelligence(AI), Difference between Intelligence and Artificial Intelligence, Definitions of AI, Strong AI and Weak AI, Application areas of AI, Comparison of Conventional and AI Computing, History of AI, Turing Test, Branches of AI, Intelligent Agents, State Space Representation, Production System, Heuristic Search, Search Methods (Uninformed Search and Informed Search), Breadth First Search, Depth First Search, Difference between Breadth First Search and Depth First Search, Hill Climbing, Best First Search.	8
2	Role of Knowledge Representation in AI, Types of Knowledge, Properties of Knowledge Representation System, Categories of Knowledge Representation Scheme, First Order Predicate Calculus, Well Formed Formula in Predicate Logic, Conversion to Clausal Form, Resolution in Predicate Logic, Semantic Nets, Properties of Semantic Nets, Frames, Scripts, Advantages and Disadvantages of Scripts.	7
3	Introduction of Expert System, Comparison between Human Expert and Expert System, Comparison between Expert System and Software System, Difference between Knowledgebase and Database, Basic Components of an Expert System, Characteristics of Expert System, Life Cycle Development of Expert System, Advantages of Expert System, Limitation of Expert System, Expert System Tools, Existing Expert Systems (DENDRAL and MYCIN).	7

4	**Introduction to LISP :** Syntax and Numeric Functions, Working with GNU CLISP, Basic Data Objects in GNU CLISP, Basic List Manipulation Functions in GNU CLISP (setq, car, cdr, cons, list, append, last, member, reverse), User Defined Functions in GNU CLISP, Predicates (atom, equal, evenp, 69odell, oddp, zerop, >=, <=, listp, null) and Conditionals (cond and if) in GNU CLISP, Logical Functions (not, or, and) in GNU CLISP, Input / Output and Local Variables (read, print, princ, terpri, format, let, prog) in GNU CLISP, Recursion and Iteration(do) in GNU CLISP, Arrays in GNU CLISP	7
5	Introduction to PROLOG, Term, Ground Term, Function, Predicate, Features of PROLOG, Program Clause, Unit Clause, Logic Program, Goal Clause, Empty Clause, Simple Query, Conjunctive Query, Structure of PROLOG Program, Working with SWI-Prolog General Syntax of PROLOG, Execution of a Query in Logic Program (Ground Query and Non-Ground Query), Law of Universal modus ponen, Ground Reduction, PROLOG Control Strategy, Search Tree and Proof Tree, Relational and Arithmetic Operators, Recursion in PROLOG, Lists manipulation in PROLOG, Iterative programming in PROLOG.	7

COURSE OUTCOMES: The students would have learnt

CO1: Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
CO2: Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
CO3: Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing
CO4: Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
CO5: Formulate and solve problems with uncertain information using Bayesia approaches.
CO6: Apply concept Natural Language processing to problems leading to understanding of cognitive computing

Text Books:

1. E. Rich and K. Knight, Artificial Intelligence, Forty Sixth Edition, Tata McGrawHill,2007.
2. D.W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Tenth Edition, Prentice Hall of India, 2001.

Reference Books:

1. S. Kaushik, Logic and Prolog Programming, New Age International Limited, 2006.

Sub Title: SOFTWARE TESTING AND QUALITY ASSURANCE		
Sub Code: CS06TPE08	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. To discuss the fundamental concepts of Software Quality
2. Finding defects which may get created by the programmer while developing the software.
3. To make sure that the end result meets the business and user requirements.
4. To gain the confidence of the customers by providing them a quality product.
5. Gaining confidence in and providing information about the level of quality.

UNIT No	Syllabus Content	No of Hours
1	**Software Quality:** Ethical Basis for software Quality , Total quality Management Principles, Software Processes and Methodologies , Quality Standards , Practices & conventions	8
2	**Software Management:** Reviews and Audits . Enterprise Resource Planning Software , Measurement Theory , Software Quality Metrics, designing Software Measurement Programs , Organizational Learning.	7
3	**Improving Quality with Methodologies:** Structured information Engineering , Object-Oriented Software , Reverse Engineering , Measuring Customer Satisfaction Defect Prevention , Reliability Models , Reliability Growth Models .	7
4	**Software Quality Engineering:** Defining Quality Requirements Management, Complexity Metrics and Models, Management issues for software Quality , Project Tracking and Oversight , Use of CASE tool Technology , Role of Groupware , data Quality Control.	7
5	**Project Configuration Management:** Configuration Management Concepts, Configuration Management Process, Document Control, Configuration Management plan of the WAR Project. **Software Testing:** Unit, Integration & System testing, Benchmarking and Certification.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understanding of basic Concept of Software Testing and Quality Assurance
CO2: Define the scope of SW T&QA projects
CO3: Efficiently perform T&QA activities using modern software tools
CO4: Estimate cost of a T&QA project and manage budgets
CO5: Prepare test plans and schedules for a T&QA project

Text Books:

1. Mark Paulik, The capability Maturity Model-guidelines for Improving the software Process, Addison Wesley
2. Wilson, Rodney C, Software RX secrets of Engineering Quality Software, Prentice Hall.

Reference Books:

1. Stephan Kan, Metrics and Models in Software quality, Addison Wesley.
2. Ginac, Frank P, Customer Oriented Software Quality Insurance, Prentice Hall

Sub Title: MANAGEMENT INFORMATION SYSTEM		
Sub Code: CS06TOE01	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
2. To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
3. To enable students understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
4. To enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.
5. To provide the theoretical models used in database management systems to answer business questions.

UNIT No	Syllabus Content	No of Hours
1	**Information System:** Introduction of Information System, Fundamentals of Information System, Strategic Role of Information in Organization and Management, Three dimensions of Information System, Information System and Organization, Business Process Re-Engineering, Traditional and Computer based information system.	8
2	**Decision Support System:** Integration of Information, Types of Decision making in Organization, Decision Making Process, Models and Decision Support, Decision in business Areas, Strategic Analysis	7
3	**Information System Planning**: Types of Controlling Information System, Development of MIS Methodology and Tools/Techniques for Systematic Identification, Evaluation, Modification of MIS, Information System Success and Failure Implementation	7
4	**Information System for Business Operations:** Cross Functional Information System, A study of major Financial, Production, Human Resource Information System and Marketing Information System.	7

5	**Security and Auditing of Information System:** Management of Information System and End-User Computing, Security and Ethical issues of Information System, Major issues in Information System, Auditing of Information System.	7

COURSE OUTCOMES: The students would have learnt

CO1: Relate the basic concepts and technologies used in the field of management information systems;
CO2: Compare the processes of developing and implementing information systems.
CO3: Outline the role of the ethical, social, and security issues of information systems.
CO4: Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
CO5: Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.

Text Books:

1. Management Information System: A Contemporary Perspective, Kenneth C. Laudon and Jane Price Loudon, Maxwell Macmillan International Editions.

Reference Books:

1. Management Information System: Solving Business Problems with Information Technology, Gerald V,. Post and David L. Anderson, Tata McGraw – Hill Edition
2. Management Information System: Managing Information Technology in the Internet worked Enterprise, James A. O'Brien Tata McGraw –Hill Edition, Fourth Edition.

Sub Title: E-COMMERCE		
Sub Code: CS06TOE02	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. Discuss fundamentals of e-commerce, types and applications.
2. Evaluate the role of the major types of information systems in a business environment and their relationship to each other
3. Assess the impact of the Internet and Internet technology on business electronic commerce and electronic business
4. Identify the major management challenges for building and using information systems and learn how to find appropriate solutions to those challenges.
5. Learn strategies for e-commerce, Mobile Commerce, Wireless Application Protocol, WAP technology and Mobile Information devices.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Introduction to e-Commerce, e-Commerce Framework, e-Commerce and Media Convergence, Anatomy of e-Commerce Applications, e-Commerce Consumer Applications, e-Commerce Organization Applications	8
2	**Network Infrastructure for E- Commerce:** Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY). Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device.	7
3	**Web Security:** Client-Server Network Security, Emerging Client-Server Security Threats, Firewalls and Network Security, Data and Message Security, Encrypted Documents and Electronic Mail, Challenge Response System.	7
4	**Encryption:** Encryption techniques, Symmetric Encryption: Keys and data encryption standard, Triple encryption, Secret key encryption; Asymmetric encryption: public and private pair key encryption, Digital Signatures, Virtual Private Network.	7
5	**Electronic Payments:** Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking.EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the basic concepts and technologies used in the field of management information systems
CO2: Understand the processes of developing and implementing information systems
CO3: Be aware of the ethical, social, and security issues of information systems and
CO4: Develop an understanding of how various information systems work together to accomplish the information objectives of an organization
CO5: Understand the role of information systems in organizations, the strategic management processes, and the implications for the management and learn about the importance of managing organizational change associated with information systems implementation

Text Books:

1. Frontiers of Electronic Commerce by Ravi Kalakota & Andrew B. Whinston, Pearson Education.
2. E-Commerce – The Cutting Edge of Business by Bajaj, Tata McGraw-Hill

Reference Books:

1. Electronic Commerce by David Kosiur, Published by Microsoft Press.
2. E-business roadmap for success by Dr. Ravi Kalakota & Marcia Robinson.

Sub Title: HUMAN RESOURCE MANAGEMENT		
Sub Code: CS06TOE03	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To enable the students to understand the HR Management and system at various levels in general and in certain specific industries or organizations.
2. To help the students focus on and analyse the issues and strategies required to select and develop manpower resources
3. To develop relevant skills necessary for application in HR related issues
4. To Enable the students to integrate the understanding of various HR concepts along with the domain concept in order to take correct business decisions

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Introduction: Introduction to Human Resource Management and its definition, functions of Human Resource Management & its relation to other managerial functions. Nature, Scope and Importance of Human Resource Management in Industry, Role & position of Personnel function in the organization	8
2	**Procurement and Placement:** Need for Human Resource Planning; Process of Human Resource Planning; Methods of Recruitment; Psychological tests and interviewing; Meaning and Importance of Placement and Induction, Employment Exchanges (Compulsory Notification of vacancies) Act 1959, The Contract Labour (Regulation & Abolition) Act 1970. **Training & Development:** Difference between training and Development; Principles of Training; Employee Development; Promotion-Merit v/s seniority Performance Appraisal, Career Development & Planning	7
3	**Job Analysis & Design:** Job Analysis: Job Description & Job Description, Job Specification. **Job Satisfaction:** Job satisfaction and its importance; Motivation, Factors affecting motivation, introduction to Motivation Theory; Workers ' Participation, Quality of work life. **The Compensation Function:** Basic concepts in wage administration, company's wage policy, Job Evaluation, Issues in wage administration, Bonus & Incentives, Payment of Wages Act-1936, Minimum Wages Act-1961	7

4	**Integration:** Human Relations and Industrial Relations; Difference between Human Relations and Industrial Relations, Factors required for good Human Relation Policy in Industry; Employee Employer relationship Causes and Effects of Industrial disputes; Employees Grievances & their Redressal, Administration of Discipline, Communication in organization, Absenteeism, Labour Turnover, Changing face of the Indian work force and their environment, Importance of collective Bargaining; Role of trader unions in maintaining cordial Industrial Relations.	7
5	**Maintenance:** Fringe & retirement terminal benefits, administration of welfare amenities, Meaning and Importance of Employee Safety, Accidents-Causes & their Prevention, Safety Previsions under the Factories Act 1948; Welfare of Employees and its Importance, Social security, Family Pension Scheme, ESI act 1948, Workmen's Gratuity Act 1972, Future challenges for Human Resource Management..	7

COURSE OUTCOMES: The students would have learnt

CO1: To develop the understanding of the concept of human resource management and to understand its relevance in organizations.
CO2: To develop necessary skill set for application of various HR issues.
CO3: To analyse the strategic issues and strategies required to select and develop manpower resources.
CO4: To integrate the knowledge of HR concepts to take correct business decisions.

Text Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, Clifford Stein, "Introduction to Algorithm" ,Publisher PHI. ISBN 81-203-2141-3
2. T.N.Chhabra- Human Resource Management, Dhanpat Rai & Co.

Reference Books:

1. Lowin B. Flippo - Principles of personnel Management , Mc Graw-Hill
2. R.C. Saxena - Labour Problems and social welfare, K.Math & Co.
3. A Minappa and M. S. Saiyada - Personnel Management , Tata Mc. Graw-Hill
4. C.B. Mamoria - Personnel Management, Himalaya Publishing House, Bombay
5. T.N. Bhagotiwal - Economics of Labour and Industrial Relations, Sahitya Bhawan Agra

Sub Title: BUSINESS INTELLIGENCE		
Sub Code: CS06TOE04	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Understand the role of BI in enterprise performance management and decision support.
2. Understand the applications of data mining and intelligent systems in managerial work.
3. Understand data warehousing and online analytical processing (OLAP) concepts.
4. Learn data analysis and reporting using available BI software.
5. Learn the responsibility of BI.

UNIT No	Syllabus Content	No of Hours
1	**Business Intelligence Introduction to Business Intelligence:** Introduction to OLTP and OLAP, BI Definitions & Concepts, Business Applications of BI, BI Framework, Role of Data Warehousing in BI, BI Infrastructure Components – BI Process, BI Technology, BI life cycle, BI Roles & Responsibilities.	8
2	**Basics of Data Integration (Extraction Transformation Loading):** Concepts of data integration need and advantages of using data integration, introduction to common data integration approaches, introduction to ETL, Introduction to data quality, data profiling concepts and applications.	7
3	**Introduction to Multi-Dimensional Data Modeling:** Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs, creating cubes using SSAS.	7
4	**Basics of Enterprise Reporting:** Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, six sigma and overall architecture.	7
5	**Data Mining Functionalities:** Association rules mining, Mining Association rules from single level, multilevel transaction databases, Classification and prediction, Decision tree induction, Bayesian classification, k-nearest neighbor classification, Cluster analysis, Types of data in clustering, categorization of clustering methods.	7

COURSE OUTCOMES: The students would have learnt

CO1: Gain knowledge of Business Intelligence.
CO2: To build business projects.
CO3: To generate and manage BI reports.
CO4: To do BI Deployment, Administration & Security.
CO5: Link Business Intelligence with Data Mining.

Text Books:

1. R N Prasad, Seema Acharya: Fundamentals of Business Analytics, Wiley India, First Edition, 2011
2. J.Han and M. Kamber: Data Mining: Concepts and Techniques By Morgan Kaufman publishers, Harcourt India pvt. Ltd. Latest Edition
3. David Loshin: Business Intelligence: The Savvy Manager's Guide., Latest Edition By Knowledge Enterprise.

Reference Books:

1. Larissa Terpeluk Moss, Shaku Atre: Business Intelligence roadmap by Addison Weseley
2. Cindi Howson: Successful Business Intelligence: Secrets to making Killer BI Applications by Tata McGraw Hill
3. Mike Biere: Business intelligence for the enterprise by Addison Weseley, Ausgust 2010

Sub Title: DESIGN AND ANALYSIS OF ALGORITHMS LAB	
Sub Code: CS06PPC07	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. Understand the recursive type algorithm with their data structure
2. Understand the divide and conquer (with recursive function) and greedy algorithm like merge sort, quick sort and single source shortest path
3. Understand the dynamic programming paradigm and analysis the single source and all pair shortest path algorithm
4. Understand the branch and bound technique ,heap and Fibonacci data structure to implement optimization and sorting problem
5. Analysis about some NP class problems

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Simulate the Stack data structure (recursion) and do the posteriori analysis. • Simulate BFS, DFS on Graph and estimate the running time. • Simulate Prim's and Kruskal's Algorithm and do the posteriori analysis • Simulate Dijkstra's algorithm and do the posteriori analysis • Simulate all pair shortest path problem and do the posteriori analysis • Simulate Bellman algorithm and do the posteriori analysis • Simulate of Huffman Tree and do the posteriori analysis • Simulate of check whether a given graph is connected or not using DFS method and do the posteriori analysis • Simulate of Heap Tree and heap sort and do the posteriori analysis • Simulate of N Queen's problem using Back Tracking and do the posteriori analysis • Simulate 0/1 Knapsack problem using Dynamic Programming and do the posteriori analysis • Simulate TSP problem using Dynamic Programming and do the posteriori analysis • Simulate fractional Knapsack problem and do the posteriori analysis • Simulate to find a subset sum of a given set of integer number and do the posteriori analysis • Simulate to detect the circle in graph by using DFS algorithm and do the posteriori analysis	18

LAB OUTCOMES: The students would have learnt

CO1:   Implement recursive algorithm with array and stack data structure
CO2:   Various tools to simulate divide and conquer algorithm and greedy using graph and link list.
CO3:   Dynamic programming to optimization type and decision type problems.
CO4:   Implement some problems like data compression algorithm and sorting algorithm using tree, array etc.
CO5:   Simulate and optimize some NP class problem like SAT, clique and TSP etc.

Text Books:

1. Introduction to Algorithm, Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, Clifford Stein, Publisher PHI, ISBN 81-203-2141-3
2. Algorithms, Sanjoy Dasgupta, Christos H. Papadimitriou and Umesh V. Vazirani, Tata McGraw-Hill, 2008.
3. Python Algorithms Mastering Basic Algorithms in the Python Language by Magnus Lie Hetland.
4. Algorithm Design, Jon Kleinberg and Éva Tardos, Pearson, 2005.

Reference Books:

1. Fundamentals of computer Algorithms, Horowitz, Sahani, Galgotia. 2nd Edition, 1998.ISBN 81-7515-257-5
2. Data Structures and Algorithms Using Python Rance D. Necaise

Sub Title: JAVA LAB	
Sub Code: CS06PPC08	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To provide the knowledge of Basics of Java.
2. To learn the Concept of package and Applet in Java.
3. To develop an awareness of modern programming language.
4. Provide practical Knowledge and Skills for developing a program with java.
5. Develop ability to design a small software using java.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	- Write a program to find a factorial of a given number . - Write a program to show all relational and Logical operatior - Write a program using Constructors - Write any program using the concept of method overloading. - Write a program to show the concept of Inheritance. - Write a program to using 10 string operations - Write a program using packages - Write a program to show the concept of Synchronization in Multithreading. - Write a program to show exception handling in java - Write a program to show human face using Applets	18

LAB OUTCOMES: The students would have learnt

CO1: The basic Concept of JAVA.
CO2:   Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
CO3: About Concept of Multithreading, Packages and Applet.
CO4: Read and make elementary modifications to Java programs that solve real world problems
CO5: To develop small Software using JAVA.

Text Books:

1. Programming with Java A Primer, E.Balagurusamy, , Fourth Edition, McGrawHill, 2010.

Reference Books:

1. Java TM 2: The Complete Reference, H.Schildt, Fourth Edition, Tata McGrawHill, 2001.
2. A Programmer's Guide to Java TM SCJP Certification A Comprehensive Primer, K. A. Mughal and R. W. Rasmussen, Third Edition, Addison Wesley, 2008.

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
FOURTH YEAR, SEMESTER - VII
W.E.F. SESSION 2021-22

Branch :- Computer Science & Engg.   **Year : IV**   **Sem- VII**

S.No.	Code No.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS07TPEX	Professional Elective-I	3	0	0	30	70	100	3
2	CS07TPEX	Professional Elective-II	3	0	0	30	70	100	3
3	CS07TOEX	Open Elective-I	3	0	0	30	70	100	3
4	CS07TPC14	Compiler Design	3	0	0	30	70	100	3
	PRACTICAL								
1	CS07PPC09	Compiler Design Lab	0	0	3	30	20	50	1.5
2	CS07PPR03	Major Project –I	0	0	6	60	40	100	3
3	CS07PPS01	Seminar	0	0	3	50	--	50	1.5
			Total						**18**

	Professional Elective-I & II Subject VII Sem.				Open Elective-I Subject VII Sem.		
S.No	Subject Code	Subject	Credits	S.No.	Subject Code	Subject	Credits
1	CS07TPE09	TCP/IP Internetworking	3	1	CS07TOE05	Soft Computing	3
2	CS07TPE10	Web Technology	3	2	CS07TOE06	Real Time System	3
3	CS07TPE11	Data Mining	3	3	CS07TOE07	Distributed System	3
4	CS07TPE12	Cyber Crime & Security	3	4	CS07TOE08	Visual Basic.Net	3

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
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FOURTH YEAR, SEMESTER - VIII
W.E.F. SESSION 2021-22

Branch :- Computer Science & Engg.   **Year : IV**   **Sem- VIII**

S.No.	Code No.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS08TPEX	Professional Elective-I	3	0	0	30	70	100	3
2	CS08TOEX	Open Elective-I	3	0	0	30	70	100	3
3	CS08TOEX	Open Elective-II	3	0	0	30	70	100	3
	PRACTICAL								
1	CS08PPEX	Professional Elective-I Lab	0	0	3	30	20	50	1.5
2	CS08PPR04	Major Project -II	0	0	12	120	80	200	6
			Total						**16.5**

Professional Elective-I Subject VIII Sem.				Open Elective-I & II Subject VIII Sem.			
S.No	Subject Code	Subject	Credits	S.No.	Subject Code	Subject	Credits
1	CS08TPE13	Network Security	3	1	CS08TOE09	Enterprise Resource Management	3
2	CS08TPE14	Mobile Application Development	3	2	CS08TOE10	Information Retrieval Systems	3
3	CS08TPE15	Cloud Computing	3	3	CS08TOE11	Wireless Sensor Network	3
4	CS08TPE16	Big Data Analysis	3	4	CS08TOE12	Machine Learning	3

Professional Elective Subject Lab VIII Sem			
S.No	Subject code	Subject	Credits
1	CS08PPE01	Network Security Lab	1.5
2	CS08PPE02	Mobile Application Development Lab	1.5
3	CS08PPE03	Cloud Computing Lab	1.5
4	CS08PPE04	Big Data Analysis Lab	1.5

Sub Title: TCP/IP INTERNETWORKING		
Sub Code: CS07TPE09	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Analyse and differentiate networking protocols used in TCP/IP protocol suite.
2. Implement the concepts of naming and addressing to IPv4 and their extension to IPv6.
3. Categorize problems such as reliable transport, data delay, congestion and flow control and describe congestion control schemes used in TCP.
4. Discuss the Internet best-effort type of service and its improvements.
5. Discuss the functionality of ATM network and ISDN.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Introduction to internetworking, Overview of OSI Model TCP/IP protocol suite, Basics of switching technologies and switches, Comparisons of different models, Gateways.	8
2	**Internet Protocol:** Purpose of Internet Protocol, Internet datagram, Options, Checksum, ARP and RARP Routing Methods: Routing Table, ICMP, IGMP. **IP Addresses:** Introduction, Address Classification, A sample internet with classful addressing, Subnetting, Supernetting, Classless addressing, Security at the IP Layer, IPSec, IPv4 and IPv6 packet formats.	7
3	**Routing Protocols:** Unicast Routing Protocols: Interior and Exterior routing, RIP, OSPF, BGP, **Multicasting:** Introduction, Multicast Routing, Multicast Routing Protocols, Multicast Trees, DVMRP, MOSPF, CBT,PIM, MBONE.	7
4	**Transmission Control Protocol:** **TCP:**TCP operation, Segment, Sliding window, Silly window, Options, TCP state machine, Karn's Algorithm, Congestion control- Leaky bucket and Token bucket algorithms. **UDP:** User Datagram, UDP operations, Checksum calculation.	7

5	**TCP/IP Over ATM Networks:** ATM reference model, ATM Switch, Interconnection Network, Virtual circuit in ATM, Paths, Circuits and identifiers, ATM cell transport and adaptation layers, packet type and multiplexing, IP Address binding in an ATM Network, Logical Subnet Concept and Connection Management. ISDN and B-ISDN.	7

COURSE OUTCOMES: The students would have learnt
CO1: Understand the functions of each layer of TCP/IP model. CO2: Understand the functions of different Protocols. CO3: Understand the congestion control provided by the protocols. CO4: Understand the Quality of Services mechanism provided by protocol. CO5: Understand the concept of ATM and ISDN Network.

Text Books:

1. Internetworking with TCP/IP by Comer, Vol. 1, PHI Pub.
2. TCP/IP Protocol suite by Behrouz A. Forouzan.,TMH Pub.

Reference Books:

1. Computer Networking by James F. Kurose, Keith W. Ross, Pearson Education
2. TCP/IP Illustrated By Wright and Stevens, Vol.2, Pearson Education
3. An Introduction to Computer Networks by Kenneth C. Mansfield Jr. James L.

Sub Title: WEB TECHNOLOGY		
Sub Code: CS07TPE10	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Become familiar with graphic design principles that relate to web design and learn.
2. How to implement theories into practice.
3. Develop skills in analyzing the usability of a web site.
4. Understand how to plan and conduct user research related to web usability.
5. Learn the language of the web: HTML and CSS.
6. To work on VB-Script, Java Script, XML, PHP etc.

UNIT No	Syllabus Content	No of Hours
1	Fundamentals of web, History of the web, Growth of the web in post decade, Web function, Security aspects on the web, Computational features encompassing the web, working web. Browsers, concepts of search Engines, Searching the web, web Servers.	8
2	**Internet:** Networks, Client & Server, WWW, URL, HTTP, Internet requirements, Internet Services, Internet Java Script introduction, operators, statements, loops, object manipulation, function, object, events handler, always, events.	7
3	**HTML:** Introduction, cascading style sheets, content positioning HTML content, Downloadable fonts, using Java script with positioned content, Layer object, Handling events using localized scripts, Animating images, VB script, Introduction, Adding VB script to web Range, working with variables, constants, arrays, objects, conditional statements loop statements, Forms.	7
4	**Active Server Page (ASP):** Introduction , Internet Information System , A authentication, Basic authentication , NT challenge response, active server page, asp objects , server objects, file system objects, session, accessing database with an ASP page, create an ODBC ADO connection object, common methods & Properties events, collection ADO record set object.	7
5	**XML** : Introduction, To XML, XML schemas, DOM structure model, using XML queries, Building a path, sharing functions. Introduction of personal home page (PHP) design.	7

COURSE OUTCOMES: The students would have learnt

CO1: Have a Good grounding of Web Application Terminologies.
CO2: Improvement the knowledge about the web security in Internet Tools,
CO3: Web designing use in E– Commerce and other web services.
CO4: Get introduced in the area of Online Game programming.
CO5: Expertise in the web pages designing for software companies.
CO6: Easy in software development etc.

Text Books:

1. Web Technology, Achyut S Goklbole and Atul Khute, Tata McGraw Hill.
2. Web Technology: A Developer's perspective, Gopalan NO Akilandeswari, PHP.

Reference Books:

1. Web Technology & Design, C Xavier, Tata Mc Grarw Hill.

Sub Title: DATA MINING		
Sub Code: CS07TPE11	**No. of Credits : =3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. To introduce the concept of data Mining as an important tool for enterprise data management and as a cutting edge technology for building competitive advantage.
2. To enable students to effectively identify sources of data and process it for data mining
3. To make students well versed in all data mining algorithms, methods of evaluation.
4. To impart knowledge of tools used for data mining
5. To provide knowledge on how to gather and analyze large sets of data to gain useful business understanding.
6. Get in-depth hands-on experience in designing and developing a real operational system.

UNIT No	Syllabus Content	No of Hours
1	**Data Ware Housing:** Introduction, Multidimensional data model, OLAP Operation, Warehouse schema, Data Ware Housing Architecture, Warehouse Server, Metadata, OLAP, engine. **Data Mining:** Introduction, KDD Vs Data mining, DBMS Vs DM , DM Techniques , Other mining problem, Issues & Challenges in DM,DM Application Areas.	8
2	**Association Rules:** Introduction, Methods to discover association rules, A Priori Algorithm ,Partition Algorithm, Pincer –Search algorithm , Dynamic Item set counting algorithm , FP-tree Growth algorithm , Incremental algorithm, Border algorithm.	7
3	**Clustering Techniques:** Introduction, Clustering paradigms, Partitioning algorithms, k-Medoid Algorithm, CLARA ,CLARANS , Hierarchical clustering , DBSCAN , BIRCH, CURE, Categorical clustering algorithms , STIRR, ROCK , CACTUS.	7
4	**Decision Trees:** Introduction, Tree construction principal, Best spilt splitting indices, Splitting criteria, Decision tree construction algorithm, CART, ID3,C4.5 , CHAID , Decision tree construction with presorting , Rainforest , CLOUDS, BOAT.	7
5	**Web Mining:** Web mining, Web content mining, Web structure mining, Web usage mining, Text mining, Episode rule discovery for texts, Hierarchy of categories, Text clustering.	7

COURSE OUTCOMES: The students would have learnt

CO1: Demonstrate an understanding of the importance of data mining and the principles of business intelligence
CO2: Organize and Prepare the data needed for data mining using pre preprocessing techniques
CO3: Perform exploratory analysis of the data to be used for mining.
CO4: Implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets.
CO5: Define and apply metrics to measure the performance of various data mining algorithms.

Text Books:

1. Data Mining techniques, Arun K Pujari Universities press
2. Data Mining concepts & techniques, Jiawei han , Micheline kamber Morgan Kaufmann publisher Elsevier India

Reference Books:

1. Data Mining methods for knowledge Discovery, Cios , Pedrycz , swiniarski Kluwer academic publishers London

Sub Title: CYBER CRIME AND SECURITY		
Sub Code: CS07TPE12	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. The learner will understand key terms and concepts in cyber law, intellectual property and cyber crimes, trademarks and domain theft.
2. The learner will be able to examine secure software development practices.
3. The learner will understand principles of web security.
4. The learner will be able to incorporate approaches for incident analysis and response

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UNIT No	Syllabus Content	No of Hours
1	Introduction to Cyber Law Evolution of Computer Technology, emergence of Cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.	8
2	Information technology Act Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature, Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.	7
3	Cyber law and related Legislation Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Sections of Indian Penal Code, Relevant Sections of Reserve Bank of India Act, Law Relating To Employees And Internet, Alternative Dispute Resolution , Online Dispute Resolution (ODR).	7
4	Electronic Business and legal issues: Evolution and development in E-commerce, paper vs paperless contracts E-Commerce models- B2B, B2C,E security.	7

5	Application area : business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the nature and scope of cybercrime.
CO2: Develop knowledge of major incidents of cybercrime and their resulting impact.
CO3: Analyze and discuss national and global digital law enforcement efforts.
CO4: Critically consider specific laws and policies governing cybercrime detection
CO5: Identify and evaluate the specific technology that facilitates cybercrime and digital law Enforcement.

Text Books:

1. Cyber Laws: Intellectual property & E Commerce, Security- Kumar K, dominant Publisher
2. Information Security policy &implementation Issues, NIIT, PHI
3. Cyber Crime notorious Aspects of the Humans & net Criminals activity in Cyber World Barna Y Dayal D P Dominant Publisher

Reference Books:

1. Cyber Crime Impact in the new millennium, Marine R.C. Auther press
2. Spam Attack, Cyber Stalking & abuse, Barna Y, Dayal D P Dominant publisher
3. Frauds & Financial criouses in Cyber space, Barna Y, Dayal D P , Dominant publisher

Sub Title: SOFT COMPUTING		
Sub Code: CS07TOE05	**No. of Credits :3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	IA+ESE=30+70	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. To familiarize with soft computing concepts.
2. To introduce the fuzzy logic concepts, fuzzy principles and relations.
3. To Basics of ANN and Learning Algorithms.
4. ANN as function approximation.
5. Genetic Algorithm and its applications to soft computing.
6. Hybrid system usage, application and optimization.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to ANS Technology**: Elementary Neurophysiology, models of a neuron, neural networks viewed as directed graphs, feedback from neurons to ANS, artificial intelligence and neural networks.	8
2	**Learning & Training:** Hebbian memory based, competitive, error-correction. **Learning Credit Assignment Problem:** supervised and unsupervised learning, memory models, recall and adaptation, network architecture, single layered feed forward networks, multilayered feed forward networks, recurrent networks, topologies.	7
3	Activation and Synaptic dynamics, stability and convergence. **A suevey of neutral network models:** Single layered perception, least mean square algorithm, multi-layered perceptrons, back propagation algorithm XOR- problem, the generalized delta rule, BPN applications, Adalines and Madalines- Algorithm and applications.	7
4	**Applications:** The traveling salesperson problem, talking network and phonetic typewriter: Speech generation and Speech recognition, character recognition and retrieval, handwritten digital recognition.	7
5	**Adaptive fuzzy systems:** Introduction to Fuzzy sets, and operations, Examples of Fuzzy logic, Fuzzy Associative memories, fuzziness in neural networks, comparison of fuzzy and neural Truck-Backer upper control systems.	7

COURSE OUTCOMES: The students would have learnt

CO1: List the facts and outline the different process carried out in fuzzy logic, ANN and Genetic Algorithms.
CO2: Explain the concepts and meta-cognitive of soft computing.
CO3: Apply Soft computing techniques the solve character recognition, pattern classification, regression and similar problems.
CO4: Outline facts to identify process/procedures to handle real world problems using soft computing.
CO5: Evaluate various techniques of soft computing to defend the best working solutions.
CO6: Design hybrid system to revise the principles of soft computing in various applications.

Text Books:

1. Artificial Neural Networks by B. Yagna Narayan
2. Neural Networks by James A. Freeman and David M.Strapetus

Reference Books:

1. Neural Networks- A comprehensive foundation by Simon Hay kin (LPE)

Sub Title: REAL TIME SYSTEM		
Sub Code: CS07TOE06	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Develop an understanding of various Real Time systems Application
2. Obtain a broad understanding of the technologies and applications for the emerging and exciting domain of real-time systems
3. Get in-depth hands-on experience in designing and developing a real operational system.

UNIT No	Syllabus Content	No of Hours
1	**Real Time System:** Introduction to Real Time Systems, Classification of Real Time System, Concept of Computer Control, Types of Real Time Operating Systems.	8
2	**Requirements for Real Time Systems:** Human Computer Interaction in Real Time Systems, Hardware Requirement for Real time Systems, Specialized Processors, Interfaces & Communications.	7
3	**Modeling Real Time Systems:** Purpose of the Model, Structural Elements, Interfaces, Event –Triggered versus Time –Triggered, Interrupts, Overview of Real Time Languages.	7
4	**Real Time Operating Systems:** RTOS Overview, RTOS Components, Task Management and Memory Management, Scheduling Strategies, Comercial Real Time Operating System, Intertask Communication and Synchronization, Real Time Kernels, Practical Real Time Operating System	7
5	**Design Of Real Time Systems:** Planning and Development Phase, Specification for Real –Time Systems, Preliminary Design, Basic Software Engineering Principles, Basic Design Using an RTOS, Multi Processing Systems.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand concepts of Real-Time systems and modelling
CO2: Recognize the characteristics of a real-time system
CO3: Understand and develop document on an architectural design of a real-time system
CO4: Develop and document Task scheduling, resource management, real-time operating systems and fault tolerant applications of Real-Time Systems.

Text Books:

1. Real time Systems, Pearson Education, J. W. S. Liu, 6th impression, 2008.
2. Real Time Systems, R. Mall, Pearson, 2007.

Reference Books:

1. Real Time Systems, C. M. Krishna and K. G. Shin, McGraw Hill, reprinted 2004.
2. Real Time Systems Design & Analysis, P. A. Laplante, Willey, 3rd Ed, 2004.

Sub Title: DISTRIBUTED SYSTEM		
Sub Code: CS07TOE07	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To know distributed file systems
2. To know security and protection of distributed file system
3. To know distributed services.
4. To knowledge of Synchronization and Deadlock.
5. To know about optimization technique.

UNIT No	Syllabus Content	No of Hours
1	**Fundamentals of Distributed Computing:** Evolution of Distributed Computing Systems, System models, issues in design of Distributed Systems, Distributed computing environment, web based distributed model, computer networks related to distributed systems and web based protocols.	8
2	**Message Passing for Communication:** Inter process Communication, Desirable Features of Good Message-Passing Systems, Issues in IPC by Message, Synchronization, Buffering, Multidatagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication.	7
3	**Remote Procedure Calls:** The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshalling Arguments and Results, Server Management, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, Lightweight RPC, Optimization for Better Performance.	7
4	**Distributed Shared Memory:** Design and Implementation issues of DSM, Granularity, Structure of Shared memory Space, Consistency Models, replacement Strategy, Thrashing, Other Approaches to DSM, Advantages of DSM.	7

5	**Synchronization and Distributed File Systems:** Clock Synchronization, Event Ordering, Mutual Exclusion, Election, Algorithms. Desirable Features of a good Distributed File Systems, File Models, File Accessing Models, File-sharing Semantics, File caching Schemes, File Replication, Fault Tolerance, Design Principles, Sun's network file system, Andrews file system, comparison of NFS and AFS.	7

COURSE OUTCOMES: The students would have learnt

CO1: Know to hardware and software issues in modern distributed systems.
CO2: Get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems.
CO3: Analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.
CO4: Know about Shared Memory Techniques.
CO5: Have sufficient knowledge about file access.

Text Books:

1. Distributed Systems Principles and Paradigms, Tanenbaum S. Maarten V.S (Pearson Education)
2. Distributed Systems concepts and design, George Coulouris, Jean Dollimore. Tim Kindberg:

Reference Books:

1. Distributed Computing: Fundamentals, Simulations and Advanced Topics by Hagit Attiya and Jennifer Welch
2. Distributed Algorithms by Nancy Lynch

Sub Title: VISUAL BASIC.NET		
Sub Code: CS07TOE08	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Describe the basic structure of a Visual Basic.NET project and use main features of the integrated   development environment (IDE).
2. Learn about the different control available in Visual Basic.Net.
3. Design/develop programs with GUI interfaces.
4. Learn about the concept of Object oriented programming.
5. Learn to create application using ADO.Net.

UNIT No	Syllabus Content	No of Hours
1	Introduction to .NET, .NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries. Introduction to visual studio, Project basics, types of project in .Net, IDE of VB.NET- Menu bar, Toolbar, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object Browser. .	8
2	**The VB.NET Language:** Variables -Declaring variables, Data Type of variables, Forcing variables declarations, Scope & lifetime of a variable, Constants, Arrays, types of array, control array, Collections, Subroutines, Functions. Control flow statements: conditional statement, loop statement. Msgbox & Inputbox.	7
3	**Working with Forms:** Loading, showing and hiding forms, controlling One form within another. **GUI Programming with Windows Form:** Textbox, Label, Button, Listbox, Combobox, Checkbox, PictureBox, RadioButton, Panel, scroll bar, Timer.There Properties, Methods and events. OpenFileDilog, SaveFileDialog, FontDialog, ColorDialog Link Label. **Designing Menues :** Context Menu, access & shorcut keys.	7
4	**Object Oriented Programming:** Classes & objects, fields Properties, Methods & Events, constructor, inheritance. Access Specifiers: Public Private, Projected. Overloading, My Base & My class keywords.	7

5	**Database programming with ADO.NET:** Overview of ADO, from ADO to ADO.NET, Accessing Data using Server Explorer. Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB. Display Data on data bound controls, display data on data grid. Generate Reports Using Crystal Report Viewer.	7

COURSE OUTCOMES: The students would have learnt

CO1: .NET Framework and describe some of the major enhancements to the new version of Visual Basic.
CO2: Perform tests, resolve defects and revise existing code.
CO3: Learn to apply Object oriented concept in programming.
CO4: Learn to create applications using Microsoft Windows Forms.
CO5: Learn to create applications using ADO. NET.

Text Books:

1. VB.NET Programming Black Book by stevenholzner –dreamtech publications
2. Mastering VB.NET by Evan gel ospetroutsos- BPB publications

Reference Books:

1. Introduction to .NET framework-Worx publication
2. msdn.microsoft.com/net/

Sub Title: COMPILER DESIGN		
Sub Code: CS07TPC14	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Learn Basic Concept of compiler design.
2. To Discuss Six phases of compiler.
3. To Learn Basic functions of All Phases of Compiler.
4. To Learn Functions of Symbol Table and Error Handler
5. Develop ability to analyze a compiler.

UNIT No	Syllabus Content	No of Hours
1	Overview of translation process. , Definition, Phases of Compiler, Lexical analysis: Introduction, Functions of lexical Analysis, automatic generation of lexical analyzers	8
2	**Parsing Theory**: Introduction, Difference between Top Down and bottom up parser. Different Types of Parsers : Predictive Parser, Shift-Reduce Parser, LR Parsers(SLR, CLR, LALR), Operator Precedence Parser Automatic generation of parsers.	7
3	**Intermediate Code Generation:** Different intermediate forms: Syntax tree , TAC , Quadruples, Triples, . Indirect Triples, Syntax directed translation mechanism and attributed definition. **Code Optimization:** Global data flow analyses, A few selected optimizations like command sub expression removal, loop invariant code motion, strength reduction etc.	7
4	**Code Generation:** DAG, Machine model, order of evaluation, registers allocation and code selection, Code generation algorithm.	7
5	**Run Time Theory Management:** static memory allocation and stack based memory allocation schemes. Symbol table management.	7

COURSE OUTCOMES: The students would have learnt

CO1: Fundamentals of Compiler Design.
CO2: Translation Mechanism from Input to Output in Compiler.
CO3: To know about compiler generation tools and techniques
CO4: To understand the importance of All phases of Compiler
CO5: To Analyze a compiler for a simple programming language

Text Books:

1. Gulshan Goyal, Compiler Design , sun India publication.
2. Anamika Jain, compiler Design.

Reference Books:

1. A.V.Aho, Ravi Sethi, J.D.Ullman, Compilers tools and Techniques, Addison Wesley, 1987.
2. Waite W.N. and Goos G., Compiler construction' springer verlag, 1983.
3. Tremblay J.P. and Sorenson, P.G. the theory and practice of compiler writing, Mc Graw Hil, 1984.

Sub Title: COMPILER DESIGN LAB	
Sub Code: CS07PPC09	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. The understanding of compiler design.
2. To learn different phases of compiler and how to implement them.
3. To develop an awareness of the function and complexity of modern compilers.
4. Provide practical Knowledge and Skills for developing a compiler.
5. Develop ability to design and analyze a compiler.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	- Write a C/C++ program to implement the design of a Lexical analyzer to recognize the tokens defined by the given grammar. - Write a program to find string is identifier or not. - Write a program for NFA. - Write a program to find all terminal s and non terminal in a given grammer. - Write a program to find the FIRST of all Non Terminal of Given Grammer. - Write a program to find the FOLLOW of all Non Terminal of Given Grammer. - Write a C program to implement Type Checking - Write a Program to implement intermediate Code. - Write a program to optimize an Intermediate code Using Deadcolde Elimination - Write a program to optimize an Intermediate code Using Common Sub Expression Elimination	18

LAB OUTCOMES: The students would have learnt

CO1: Understanding of basic Concept of Compiler Design.
CO2: Students will understand the practical approach of Working of compiler.
CO3: To know about compiler generation tools and techniques
CO4: To understand the importance of code optimization
CO5: Design a compiler for a simple programming language

Text Books:

1. Compiler Design, Gulshan Goyal, Sun India publication.
2. Compiler Design, Anamika Jain

Reference Books:

1. Object Oriented Programming with C++ by M P Bhave S,A. Patekar, Pearson Education
2. Compilers tools and Techniques, A.V.Aho, Ravi Sethi, J.D.Ullman, Addison Wesley, 1987.
3. Compiler construction, Waite W.N. and Goos G., springer verlag, 1983.
4. P.G. the theory and practice of compiler writing, Tremblay J.P. and Sorenson, Mc Graw Hil, 1984.

Sub Title: NETWORK SECURITY		
Sub Code: CS08TPE13	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. The concepts of classical encryption techniques and concepts of finite fields and number theory.
2. And explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
3. And explore the design issues and working principles of various authentication protocols, PKI standards.
4. And explore various secure communication standards including Kerberos, IPsec, and SSL/TLS and email.
5. The ability to use existing cryptographic utilities to build programs for secure communication.

UNIT No	Syllabus Content	No of Hours
1	Services , Mechanisms ,and Attacks , The OSI Security Architecture , A Model for Network Security , symmetric cipher model , substitution techniques Transposition techniques, Steganography.	8
2	Block ciphers and the data encryption standard, Simplified DES, Block cipher principles , The data Encryption Standard ,The Strength of DES. Differential and Linear Cryptanalysis ,Block Cipher Design principles ,Block Cipher Modes of Operation , Evaluation Criteria for AES The AES cipher , Triple DES , blowfish , RC5, Rc4 Stream Cipher	7
3	**Principles of public:** Key Cryptosystems , Public –Key cryptosystems , Applications for public –Key Cryptosystems , Requirements for public –Key Cryptosystems , Public –Key Cryptosystems , The RSA Algorithm , Computational Aspects , The Security of RSA , Key management , Distribution of public keys , Public –Key Distribution of Secret Keys , Differ –Hellmann Key Exchange.	7
4	**Web Security:** Web Security Threats , Web Traffic Security Approaches , SSL Architecture , SSL Record Protocol , Change Cipher Spec Protocol ,Alert Protocol , Handshake Protocol , Cryptographic Computations ,Transport Layer Security , Secure Electronic Transaction.	7

5	**Intruders:** Intrusion Techniques ,Intrusion Detection , Audit Records , Statistical Anomaly Detection ,Rule –Based Intrusion Detection ,The Base – Rate Fallacy , Distributed Intrusion Detection , Honeypots , Intrusion Detection Exchange Format Firewall Design principles , Firewall Characteristics , Types of Firewalls , Firewall Configurations.	7

COURSE OUTCOMES: The students would have learnt

CO1: Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory.

CO2: Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication.

CO3: Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes

CO4: Apply different digital signature algorithms to achieve authentication and create secure applications

Text Books:

1. Cryptography And Network Security, Principles And Practice Sixth Edition, William Stallings, Pearson
2. Information Security Principles and Practice By Mark Stamp, Willy India Edition
3. Cryptography & Network Security, Forouzan, Mukhopadhyay, McGrawHill

Reference Books:

1. Cryptography and Network Security Atul Kahate, TMH
2. Cryptography and Security, C K Shyamala, N Harini, T R Padmanabhan, Wiley-India
3. Information Systems Security, Godbole, Wiley-India
4. Information Security Principles and Practice, Deven Shah, Wiley-India
5. Security in Computing by Pfleeger and Pfleeger, PHI
6. Build Your Own Security Lab : A Field Guide for network testing, Michael Gregg, Wiley India

Sub Title: MOBILE APPLICATION DEVELOPMENT		
Sub Code: CS08TPE14	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To facilitate students to understand android SDK
2. To help students to gain a basic understanding of Android application development
3. To inculcate working knowledge of Android Studio development tool

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UNIT No	Syllabus Content	No of Hours
1	**Introduction to Android:** The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android, Manifest file.	8
2	**Android Application Design Essentials:** Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.	7
3	**Android User Interface Design Essentials:** User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.	7
4	**Android Applications:** Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.	7
5	**Using Common Android APIs:** Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World..	7

COURSE OUTCOMES: The students would have learnt

CO1: Identify various concepts of mobile programming that make it unique from programming for other platforms.
CO2: Critique mobile applications on their design pros and cons.
CO3: Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
CO4: Program mobile applications for the Android operating system that use basic and advanced phone features.
CO5: Deploy applications to the Android marketplace for distribution.

Text Books:

1. Android Wireless Application Development, Lauren Darcey and Shane Conder, Pearson Education, 2nd ed. (2011)

Reference Books:

1. Professional Android 2 Application Development, Reto Meier, Wiley India Pvt Ltd
2. Beginning Android, Mark L Murphy, Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies, Barry Burd, 1st Edition.

Sub Title: CLOUD COMPUTING			
Sub Code: CS08TPE15	No. of Credits : 3=3: 0: 0(L-T-P)		No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70		Total no of contact hours:36

COURSE OBJECTIVE:
1. Basics of cloud computing.
2. Key concepts of virtualization.
3. Different Cloud Computing services
4. Cloud Implementation, Programming and Mobile cloud computing
5. Cloud Backup and solutions

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Introduction to Cloud Computing, Evolution of Cloud, Cloud Computing Characteristics, Benefits and Challenges of Cloud Computing, Emergence of Cloud Computing, Cloud Based Service Offerings, Cloud Computing Application.	8
2	**Cloud Models:** Introduction to Cloud Models, Cloud Models: Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud.	7
3	**Standard & Security:** Introduction to Cloud Standards, Cloud Security Challenges, Cloud Data Security, Network Security, Host Security, Database Management.	7
4	**Cloud Services:** Introduction to Service, Infrastructure as a Service (IAAS), Platform as a Service (PAAS), Software as a Service (SAAS), Storage as a Service (StaaS), Database as a Service (DaaS), Process as a Service (PraaS), Security as a Service (SecaaS), Different Security issues of Cloud Computing.	7
5	**Virtualization:** Introduction, Virtualization Architecture, Types of Virtualization, Pros and Cons of Virtualization, Virtual Machine, Types of Virtual Machine.	7

COURSE OUTCOMES: The students would have learnt
CO1: Understand the concept of Cloud Computing and Cloud service and deployment models
CO2: Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.
CO3: Use and Examine different cloud computing services
CO4: Understand cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application
CO5: Analyze authentication, confidentiality and privacy issues in cloud computing

Text Books:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya,James Broberg, Andrzej M. Goscinski, Wiley.
2. Cloud Computing by M. N. Rao, PHI.
3. Cloud Computing: A Practical Approach by Toby Velte, Anthony Vote and Robert Elsenpeter, McGraw Hill.

Reference Books:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley India Edition.
2. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley- India,2010

Sub Title: BIG DATA ANALYSIS		
Sub Code: CS08TPE16	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To formulate the difference between Big data and Data Analytics.
2. To provide the students with the conceptual knowledge of Big Data.
3. To get familiarized with the analytical methods.
4. To explore validation and testing methods for decision making.
5. To gain knowledge on the tools such as MapReduce and hadoop

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Big Data:** Introduction to big data : Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting	8
2	**Mining data streams:** Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis- Stock Market Predictions.	7
3	**Hadoop:** History of Hadoop- the Hadoop Distributed File System – Components of Hadoop Analysing the Data with Hadoop- Scaling Out-Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce FeaturesHadoop environment.	7
4	**Framework:** Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams.	7
5	**Predictive Analysis:** Simple linear regression- Multiple linear regression-Interpretation of regression coefficients. Visualizations - Visual data analysis techniques- interaction techniques - Systems and applications.	7

COURSE OUTCOMES: The students would have learnt

CO1: Identify Big Data and its Business Implications.
CO2: List the components of Hadoop and Hadoop Eco-System
CO3: Access and Process Data on Distributed File System
CO4: Manage Job Execution in Hadoop Environment
CO5: Develop Big Data Solutions using Hadoop Eco System

Text Books:

1. Intelligent Data Analysis, Michael Berthold, David J. Hand, Springer, 2007.
2. Hadoop: The Definitive Guide, Tom White, Third Edition, O'reilly Media, 2012.
3. Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,, McGrawHill Publishing, 2012.
4. Mining of Massive Datasets, Anand Rajaraman and Jeffrey David Ullman, CUP, 2012.
5. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics Bill Franks, John Wiley& sons, 2012.
6. Making Sense of Data, Glenn J. Myatt, John Wiley & Sons, 2007.
7. Big Data Glossary, Pete Warden, O'Reilly, 2011.

Reference Books:

1. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, 2nd Edition, Elsevier, Reprinted 2008.
2. Intelligent Data Mining, Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, Springer, 2007.
3. Harness the Power of Big Data The IBM Big Data Platform Paul Zikopoulos, Dirkde Roos, Krishnan Parasuraman, Thomas Deutsch, James, Giles , David Corrigan, Tata McGraw Hill Publications, 2012.
4. Big Data Science & Analytics: A HandsOn Approach, Arshdeep Bahga, Vijay Madisetti, VPT, 2016
5. Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series), Bart Baesens, John Wiley & Sons,2014

Sub Title: ENTERPRISE RESOURCE MANAGEMENT		
Sub Code: CS08TOE09	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. To discuss the fundamental concepts an enterprise and its integration of major functions
2. To discuss the various technologies used for an ERP.
3. To discuss importance of information in an organization.
4. To discuss Material resource management, forecasting and job scheduling
5. To discuss Software implementation methods and various other related issues

UNIT No	Syllabus Content	No of Hours
1	**Function of Business Organizations:** Personnel management, Financial management, marketing management, Sales order Processing , Manufacturing managements , Human Resource Management etc , data and information , Operation of functional areas. Integrated view of ERP	8
2	**Technologies of ERP:** knowledge based system , Decision support system , Executive information system , Electronic commerce, , Databases system , Business Engineering , Business process Engineering , Networking , 3 tier and 2 tier architecture.	7
3	**Management information system:** MIS, data & information, levels of Management , information requirement , objectives of information channels, information strategies	7
4	**Information and planning:** Resource management benefit of management planning process objective and its characteristic , policy and procedures ,forecasting and its varies aspects . Scheduling , MRP , MRP-II	7
5	**ERP implement issues:** software development life cycle , pre Evaluation schemes , post implement issues, case studies .	7

COURSE OUTCOMES: The students would have learnt

CO1: Basic concepts of an enterprise functions and its integration for ERP.
CO2: Introduction of different technologies related to ERP.
CO3: Importance of an information for all levels of organization.
CO4: Concepts of ERP for the manufacturing perspective
CO5: The implementation strategies of the ERP life cycle.

Text Books:

1. Enterprise resource planning by Alixis Leon TMH
2. Management Information System by Jawardekar

Reference Books:

1. Kinematics and Synthesis of linkages –Hartenberg and Denavit– McGrew Hill Book Co
2. ERP by Garg and Ravichandran
3. Management Information Systems : Louden & Louden
4. Information System and MIS : J Kanter

Sub Title: INFORMATION RETRIEVAL SYSTEMS			
Sub Code: CS08TOE10	**No. of Credits : 3=3: 0: 0(L-T-P)**		**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=30+70**		**Total no of contact hours:36**

COURSE OBJECTIVE:

1. Demonstrate genesis and diversity of information retrieval situations for text and hyper media.
2. Describe hands-on experience store, and retrieve information from www using semantic approaches.
3. Demonstrate the usage of different data/file structures in building computational search engines.
4. Analyze the performance of information retrieval using advanced techniques such as classification, clustering, and filtering over multimedia.
5. Analyze ranked retrieval of a very large number of documents with hyperlinks between them.

UNIT No	Syllabus Content	No of Hours
1	**Retrieval Strategies:** vector space model, Probabilistic retrieval strategies: Simple term weights, Non binary independence model, Language models.	8
2	**Retrieval Utilities:** Relevance feedback, clustering, N-grams, Regression analysis, Thesauri	7
3	**Retrieval Utilities:** Semantic networks, parsing Cross –Language: Information Retrieval: Introduction, Crossing the Language barrier.	7
4	**Efficiency:** Inverted Index, Query processing, Signature files, Duplicate document detection.	7
5	Integrating structured data and text. A historical progression, Information retrieval as relational application, Semi Structured search using a relational schema. Distributed Information Retrieval: A theoretical Model of Distributed retrieval, web search	7

COURSE OUTCOMES: The students would have learnt

CO1: Describe the objectives of information retrieval systems.
CO2: Describe models like vector-space, probabilistic and language models to identify the similarity of query and document
CO3: Implement clustering algorithms like hierarchical agglomerative clustering and k-means algorithm.
CO4: Understand relevance feedback in vector space model and probabilistic model.
CO5: Understand query, document and phrase translation.

Text Books:

1. Information Retrieval – Algorithms and Heuristics, David A. Grossman, Ophir Frieder, Springer, 2nd Edition (Distributed by Universal Press), 2004

Reference Books:

1. Information Storage and Retrieval Systems: Theory and   Implementation, Gerald J Kowalski, Mark T Maybury Springer, 2004.
2. Mining the Web: Discovering Knowledge from Hypertext Data, Soumen Chakrabarti, Morgan – Kaufmann Publishers, 2002.
3. An Introduction to Information Retrieval, By Christopher D Manning, Prabhakar Raghavan, Hinrich Schutze, Cambridge University Press, England, 2009.

Sub Title: WIRELESS SENSOR NETWORK		
Sub Code: CS08TOE11	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. Understand the fundamentals of wireless networks.
2. Understand deployment of sensor in Wireless Sensor Network.
3. Understand design considerations for wireless networks.
4. Understand the different routing techniques of Wireless Sensor Network.
5. Understand the different challenges of Wireless Sensor Network.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Wireless Sensor Network: Introduction, Architecture, Hardware and Software used in Wireless Sensor Network.	8
2	**Applications:** Sensor network application: Motion monitoring, Environmental monitoring, Generic Architecture, Sensor network Evolution.	7
3	**Design And Deployment:** Wireless Sensor Network : Design , Goals and Issues , Sensor deployment, Scheduling and coverage issues, self-configuration and topology control, Querying, data collection and processing, Collaborative information processing and group connectivity.	7
4	**Routing:** Wireless Sensor Routing Protocols: Data Centric, Hierarchical, Location based, Energy efficient routing.	7
5	**Challenges:** Sensor Network Challenges-Miniaturization, Power management, Scalability, Remote management, Usability, Standardization and security, System Challenges- Tiny OS, Network Sensor Platforms.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the basic concepts of wireless network.
CO2: Understand the different applications of Wireless sensor network.
CO3: Understand the designing concept of Wireless Sensor Network.
CO4: Understand the different challenges of Wireless Sensor Network.
CO5: Services and layer wise security considerations.

Text Books:

1. Building Wireless Sensor Networks by Robert Faludi Binding: Paperback Publisher: O'reilly Released: 2011
2. Wireless Sensor Networks by Zhao Feng, Guibas Leonidas Binding: Paperback Publisher: Elsevier India Released: 2004

Reference Books:

1. Wireless Sensor Networks by C. S Raghavendra, Krishna M. Sivalingam, Taieb Znati Binding: Paperback Publisher: Springer/bsp Books Released: Rpt.2010

Sub Title: MACHINE LEARNING		
Sub Code: CS08TOE12	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To expose the applications of machine learning.
2. To study the various algorithms related to supervised and unsupervised learning.
3. To recognize the different types of machine learning models and how to use them.
4. To learn the theoretical and practical aspects of probabilistic graphical models.
5. To acquire the knowledge of various classification techniques.
6. To learn the various neural network algorithms.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Machine Learning:** Introduction - examples of machine learning applications - Types of machine learning- Mathematical foundations of machine learning– Introduction to Parametric Models – Non-Parametric Models –Probability Basics	8
2	**Supervised Learning:** Linear Models for Regression – Linear Basis Function Models - The Bias-Variance Decomposition - Bayesian Linear Regression - Bayesian Model Comparison, Limitations of Fixed Basis Functions - Linear Models for Classification, Discriminant Functions -Probabilistic Generative Models –Probabilistic Discriminative Models - Bayesian Logistic Regression. Neural Networks – Network Training - Feed-forward Network Functions, Back Propagation Network, Bayesian Neural Network	7
3	**Unsupervised Learning:** Clustering- K-means - EM Algorithm- Mixtures of Gaussians Dimensionality Reduction - Factor analysis - Principal Component Analysis Probabilistic PCA -Independent components analysis - Singular Value Decomposition.	7
4	**Probabilistic Graphical Model:** Graphical Models - Undirected graphical models - Markov Random Fields-Directed Graphical Models -Bayesian Networks - Conditional independence properties - Inference – Learning - Generalization - Hidden Markov Models -Conditional random fields	7
5	**Genetic Algorithms:** an illustrative example, Hypothesis space search, Genetic Programming, Models of Evolution and Learning; Learning first order rules-sequential covering algorithms-General to specific beam search-FOIL; REINFORCEMENT LEARNING – The Learning Task, Q Learning.	7

COURSE OUTCOMES: The students would have learnt

CO1: Describe the concepts and models of machine learning.
CO2: Design and implement algorithms for supervised and unsupervised learning.
CO3: Develop skills of using recent machine learning software for solving practical problems.
CO4: Analyze the efficient clustering techniques for solving real world problems.
CO5: Implement probabilistic discriminative and generative algorithms for an application and analyze the results.

Text Books:

1. Machine Learning: A Probabilistic Perspective, Kevin Murphy, MIT Press, 20122.
2. Pattern Recognition and Machine Learning, Christopher Bishop. 2e
3. Machine Learning, Tom M. Mitchell, McGraw-Hill Education (India) Private Limited, 2013

Reference Books:

1. Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 1st edition, ISBN-13: 978-0387-31073-2, 2006.
2. Introduction to Machine Learning, Ethem Alpaydin, 3rd Edition, MIT Press, ISBN: 9780262028189, 2014.
3. Machine Learning: a Probabilistic Perspective, Kevin Patrick Murphy , 4th edition, MIT Press, ISBN:9780262018029, 2013.
4. Machine Learning for Hackers, Drew Conway, John Myles White, 1st Edition, O'Reilly Media, 2012.
5. Data Mining: Practical Machine Learning Tools and Techniques, Ian H. Witten, Eibe Frank, Mark A. Hall, 3rd Edition, Morgan Kaufmann, 2011.

Sub Title: NETWORK SECURITY LAB	
Sub Code: CS08PPE01	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To train more professional in the area of Network Security
2. To support in developing vulnerability free web applications
3. To support industry in Cyber security research

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Implement Caesar cipher encryption-decryption. • Implement Monoalphabetic cipher encryption-decryption. • Implement Playfair cipher encryption-decryption. • Implement Polyalphabetic cipher encryption-decryption. • Implement Hill cipher encryption-decryption. • To implement Simple DES or AES. • Implement Diffi-Hellmen Key exchange Method. • Implement RSA encryption-decryption algorithm. • Write a program to generate SHA-1 hash. • Implement a digital signature algorithm. • Perform various encryption-decryption techniques with cryptool. • Study and use the Wireshark for the various network protocols.	18

LAB OUTCOMES: The students would have learnt

CO1: Define the concepts of Information security and their use.
CO2: Describe the principles of symmetric and asymmetric cryptography.
CO3: Understand and apply the various symmetric key algorithms.
CO4: Understand and apply the various asymmetric key algorithms.
CO5: Understand the concepts of hashing with algorithms and apply them

Text Books:

1. Cryptography And Network Security, Principles And Practice Sixth Edition, William Stallings, Pearson
2. Information Security Principles and Practice By Mark Stamp, Willy India Edition
3. Cryptography & Network Security, Forouzan, Mukhopadhyay, McGrawHill

Reference Books:

1. Fundamentals of computer Algorithms, Horowitz, Sahani, Galgotia. 2nd Edition, 1998.ISBN 81-7515-257-5
2. Cryptography and Network Security Atul Kahate, TMH
3. Cryptography and Security, C K Shyamala, N Harini, T R Padmanabhan, Wiley-India
4. Information Systems Security, Godbole, Wiley-India
5. Information Security Principles and Practice, Deven Shah, Wiley-India
6. Security in Computing by Pfleeger and Pfleeger, PHI
7. Build Your Own Security Lab : A Field Guide for network testing, Michael Gregg, Wiley India

Sub Title: MOBILE APPLICATION DEVELOPMENT LAB	
Sub Code: CS08PPE02	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To understand the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
2. To understand how to work with various mobile application development frameworks.
3. To learn the basic and important design concepts and issues of development of mobile applications.
4. To understand the capabilities and limitations of mobile devices.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Develop an application that uses GUI components, Font and Colours • Develop an application that uses Layout Managers and event listeners. • Write an application that draws basic graphical primitives on the screen. • Develop an application that makes use of databases. • Develop an application that makes use of Notication Manager • Implement an application that uses Multi-threading • Develop a native application that uses GPS location information • Implement an application that writes data to the SD card. • Implement an application that creates an alert upon receiving a message • Write a mobile application that makes use of RSS feed • Develop a mobile application to send an email. • Develop a Mobile application for simple needs (Mini Project)	18

LAB OUTCOMES: The students would have learnt

CO1: Develop mobile applications using GUI and Layouts
CO2: Develop mobile applications using Event Listener.
CO3: Develop mobile applications using Databases.
CO4: Develop mobile applications using RSS Feed, Internal/External Storage, SMS, Multi-threading and GPS.
CO5: Analyze and discover own mobile app for simple needs

Text Books:

1. Build Your Own Security Lab, Michael Gregg, Wiley India.

Reference Books:

1. Build Your Own Security Lab, Michael Gregg, Wiley India.

Sub Title: CLOUD COMPUTING LAB	
Sub Code: CS08PPE03	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To discuss the fundamental concepts of Cloud Computing
2. To learn how to use install and configure Hadoop/MapReduce/HDFS
3. To learn how to create application using Hadoop/MapReduce
4. To learn Various Cloud services provided by Amazon Web Service etc.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Installation and configuration of Hadoop/MapReduce/HDFS • Service deployment and usage over cloud. • Create an application using Hadoop/MapReduce • Case Study: Google App Engine/ Microsoft Azure/ Amazon Web Services	18

LAB OUTCOMES: The students would have learnt

CO1: Examine the installation and configuration of Hadoop/Map Reduce
CO2: Describe the functioning of Platform as a Service
CO3: Create application using Hadoop/MapReduce
CO4: Analyze and understand the functioning of different components involved in Amazon web services cloud platform.

Text Books:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya,James Broberg, Andrzej M. Goscinski, Wiley.
2. Cloud Computing" by M. N. Rao, PHI.
3. Cloud Computing: A Practical Approach" by Toby Velte, Anthony Vote and Robert Elsenpeter, McGraw Hill.

Reference Books:

1. Cloud Computing Bible", Barrie Sosinsky, Wiley India Edition.
2. Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Ronald L. Krutz, Russell Dean Vines, Wiley- India,2010

Sub Title: BIG DATA ANALYSIS LAB	
Sub Code: CS08PPE04	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. Learn Injecting data into Hadoop
2. Learn to build and maintain reliable, scalable, distributed systems with Hadooop
3. Able to apply Hadoop ecosystem components.
4. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
5. To enable students to have skills that will help them to solve complex real-world problems in for decision support.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Study of Hadoop ecosystem • Programming exercises on Hadoop • Programming exercises in No SQL • Implementing simple algorithms in Map- Reduce (3) - Matrix multiplication, Aggregates, joins, sorting, searching etc. • Implementing any one Frequent Itemset algorithm using Map-Reduce • Implementing any one Clustering algorithm using Map-Reduce • Implementing any one data streaming algorithm using Map-Reduce • Mini Project: One real life large data application to be implemented (Use standard Datasets available on the web) a) Twitter data analysis b) Fraud Detection c) Text Mining etc.	18

LAB OUTCOMES: The students would have learnt

CO1: Preparing for data summarization, query, and analysis.
CO2: Applying data modelling techniques to large data sets
CO3: Creating applications for Big Data analytics
CO4: Building a complete business data analytic solution

Text Books:

1. Intelligent Data Analysis, Michael Berthold, David J. Hand, Springer, 2007.
2. Hadoop: The Definitive Guide, Tom White, Third Edition, O'reilly Media, 2012.
3. Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Chris Eaton,

Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,, McGrawHill Publishing, 2012.
4. Mining of Massive Datasets, Anand Rajaraman and Jeffrey David Ullman, CUP, 2012.
5. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Bill Franks, John Wiley& sons, 2012.
6. Making Sense of Data, Glenn J. Myatt, John Wiley & Sons, 2007.
7. Big Data Glossary, Pete Warden, O'Reilly, 2011.

Reference Books:

1. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, 2nd Edition, Elsevier, Reprinted 2008.
2. Intelligent Data Mining, Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, Springer, 2007.
3. Harness the Power of Big Data The IBM Big Data Platform Paul Zikopoulos, Dirkde Roos, Krishnan Parasuraman, Thomas Deutsch, James, Giles , David Corrigan, Tata McGraw Hill Publications, 2012.
4. Big Data Science & Analytics: A HandsOn Approach, Arshdeep Bahga, Vijay Madisetti, VPT, 2016
5. Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series), Bart Baesens, John Wiley & Sons,2014

COURSE STRUCTURE AND SYLLABUS

(OLD-COURSE)

CBCS

Sem- VII

S.No	Subject Code	Subjects	Period /week			Evaluation Scheme			Total Credit
			L¹	T²	P³	IA	ESE	TOTAL	
1	CS7TPC01	Compiler Design	3	1	0	40	60	100	4
2	CS7TPC02	Artificial Intelligence	3	1	0	40	60	100	4
3	CS7TPEXX	PE Choice –I VIIth Semester	3	1	0	40	60	100	4
4	CS7TPEXX	PE Choice –II VIIth Semester	3	1	0	40	60	100	4
5	CS7TOEXX	OE-I VII th Semester	3	0	0	40	60	100	3
PRACTICAL									
1	CS7LPC01	Compiler Design Lab	0	0	3	30	20	50	2
2	CS7LPC02	Artificial Intelligence Lab	0	0	3	30	20	50	2
3	CS7LPR01	Seminar	0	0	3	30	20	50	2
4	CS7LPR02	Minor Project Lab	0	0	3	30	20	50	2
						Total Credits		700	27

IA- Internal Assessment , ESE – End Semester Examination

Open Elective Subjects VIIth Semester				Professional Elective Subject VII th Semester			
SN	Subject Code	Subject	Credit	SN	Subject Code	Subject	Credit
1	CS7TOE01	Web Technologies	3	1	CS7TPE01	Data Mining	4
2	CS7TOE02	Information Theory and Coding	3	2	CS7TPE02	Wireless Sensor Network	4
3	CS7TOE03	Swarm Intelligence, Co-evolution and Rough Sets	3	3	CS7TPE03	Intrusion Detection System	4
4	CS7TOE04	Digital Image Processing	3	4	CS7TPE04	Cyber Crime and Security	4

Sem- VIII

S.No.	Subject Code	Subjects	Period /week			Evaluation Scheme			Total Credit
			L¹	T²	P³	IA	ESE	TOTAL	
1	CS8TPC01	Network Security	3	1	0	40	60	100	4
2	CS8TPEXX	PE-1 VIIIth Semester	3	1	0	40	60	100	4
3	CS8TOEXX	OE-1 VIIIth Semester	3	1	0	40	60	100	4
PRACTICAL									
1	CS8LPR01	Major Project	0	0	20	150	100	250	10
2	CS8LPC01	Network Security Lab	0	0	3	30	20	50	2
						Total Credits		600	24

Open Elective Subjects VIII Semester				Professional Elective Subject VIII Semester			
SN	Subject Code	Subject	Credit	SN	Subject Code	Subject	Credit
1	CS8TOE01	Enterprise Resource Management	4	1	CS8TPE01	Soft Computing	4
2	CS8TOE02	Cloud Computing	4	2	CS8TPE02	Introduction to Computational Intelligence	4
3	CS8TOE03	Internet of Things	4	3	CS8TPE03	Neural Network Learning and Fuzzy Systems	4
4	CS8TOE04	Distributed Computing	4	4	CS8TPE04	TCP-IP	4

Class: Bachelor of Technology Seventh Semester Computer Science and Engineering
Subject Name: Compiler Design
Subject Code: CS7TPC01

UNIT-I

Overview of translation process., Definition, Phases of Compiler, Lexical analysis: Introduction, Functions of lexical Analysis, automatic generation of lexical analyzers.

UNIT-II

Parsing theory: Introduction, Difference between Top Down and bottom up parses. Different Types of Parsers : Predictive Parser, Shift-Reduce Parser, LR Parsers(SLR, CLR, LALR), Operator Precedence Parser Automatic generation of parsers.

UNIT-III

Intermediate code generation: Different intermediate forms: Syntax tree , TAC , Quadruples, Triples, . Indirect Triples, Syntax directed translation mechanism and attributed definition. Code Optimization: Global data flow analyses, A few selected optimizations like command sub expression removal, loop invariant code motion, strength reduction etc.

UNIT-IV

Code generation: DAG , Machine model, order of evaluation, registers allocation and code selection, Code generation algorithm.

UNIT-V

Run time theory management: static memory allocation and stack based memory allocation schemes. Symbol table management.

References:

1. A.V.Aho, Ravi Sethi, J.D.Ullman, *Compilers tools and Techniques*, Addison Wesley.
2. D.M.Dhamdhere, *Compiler Construction-Principles and practice*, Macmillan, India.
3. Tremblay J.P. and Sorenson, P.G. *the theory and practice of compiler writing*, McGraw Hill.
4. Waite W.N. and Goos G., *Compiler construction*, Springer Verlag.
5. Gulshan Goyal, *Compiler Design* , Sun India publication.
6. Anamika Jain, *Compiler Design*.

procedure to following when setting up a geographical information system. Tools for Map analysis: Single maps, Map reclassification, operations and attribute tables, spatial topological and geometric modeling and operations on spatial Neighborhood. Tools for map Analysis: Map pairs, map overlay and map modeling correlation between two maps. Tools for map analysis: Multiple maps, types of models, Boolean logic models, Index overlay models, Fuzzy logic methods.

Text books

1. P.A. Burrough , *Principles of Geographical Information System for Land Resource Assessment*, Clarendon Press, Oxford.
2. T.R. Smith & Piquet, *Geographic Information Systems*, London Press.
3. J.D. Ullman , *Principles of data base systems*, Computer Science Press.

Class: Bachelor of Technology Seventh Semester Computer Science and Engineering
Subject Name: Artificial Intelligence
Subject Code: CS7TPC02

UNIT-I

Introduction of Artificial Intelligence(AI), Difference between Intelligence and Artificial Intelligence, Definitions of AI, Strong AI and Weak AI, Application areas of AI, Comparison of Conventional and AI Computing, History of AI, Turing Test, Branches of AI, Intelligent Agents, State Space Representation, Production System, Heuristic Search, Search Methods (Uninformed Search and Informed Search), Breadth First Search, Depth First Search, Difference between Breadth First Search and Depth First Search, Hill Climbing, Best First Search.

Unit-II

Role of Knowledge Representation in AI, Types of Knowledge, Properties of Knowledge Representation System, Categories of Knowledge Representation Scheme, First Order Predicate Calculus, Well Formed Formula in Predicate Logic, Conversion to Clausal Form, Resolution in Predicate Logic, Semantic Nets, Properties of Semantic Nets, Frames, Scripts, Advantages and Disadvantages of Scripts.

Unit-III

Introduction of Expert System, Comparison between Human Expert and Expert System, Comparison between Expert System and Software System, Difference between Knowledgebase and Database, Basic Components of an Expert System, Characteristics of Expert System, Life Cycle Development of Expert System, Advantages of Expert System, Limitation of Expert System, Expert System Tools, Existing Expert Systems (DENDRAL and MYCIN).

Unit-IV

Introduction to LISP : Syntax and Numeric Functions, Working with GNU CLISP, Basic Data Objects in GNU CLISP, Basic List Manipulation Functions in GNU CLISP (setq, car, cdr, cons, list, append, last, member, reverse), User Defined Functions in GNU CLISP, Predicates (atom, equal, evenp, numberp, oddp, zerop, >=, <=, listp, null) and Conditionals (cond and if) in GNU CLISP, Logical Functions (not, or, and) in GNU CLISP, Input / Output and Local Variables (read, print, princ, terpri, format, let, prog) in GNU CLISP, Recursion and Iteration(do) in GNU CLISP, Arrays in GNU CLISP.

Unit-V

Introduction to PROLOG, Term, Ground Term, Function, Predicate, Features of PROLOG, Program Clause, Unit Clause, Logic Program, Goal Clause, Empty Clause, Simple Query, Conjunctive Query, Structure of PROLOG Program, Working with SWI-Prolog, General

Syntax of PROLOG, Execution of a Query in Logic Program (Ground Query and Non-Ground Query), Law of Universal modus ponen, Ground Reduction, PROLOG Control Strategy, Search Tree and Proof Tree, Relational and Arithmetic Operators, Recursion in PROLOG, Lists manipulation in PROLOG, Iterative programming in PROLOG.

Recommended books:

Text Book:

1. E. Rich and K. Knight, *Artificial Intelligence*, Forty Sixth Edition, Tata McGrawHill, 2007.
2. D.W. Patterson, *Introduction to Artificial Intelligence and Expert Systems*, Tenth Edition, Prentice Hall of India, 2001.
3. S. Kaushik, *Logic and Prolog Programming*, New Age International Limited, 2006.

Other Reference:

1. www.wikipedia.org
2. www.tutorialspoint.com

Class: Bachelor of Technology Seventh Semester Computer Science and Engineering
Subject Name: Data Mining
Subject Code: CS7TPE01

UNIT-I

Data Ware Housing :- Introduction, Multidimensional data model, OLAP Operation , Warehouse schema ,Data Ware Housing Architecture, Warehouse Server, Metadata , OLAP , engine. Data Mining:- Introduction, KDD Vs. Data mining, DBMS Vs DM , DM Techniques , Other mining problem , Issues & Challenges in DM , DM Application Areas.

UNIT-II

Association rules: -Introduction, methods to discover association rules, A Priori Algorithm, Partition Algorithm, Pincer –Search algorithm , Dynamic Item set counting algorithm , FP-tree Growth algorithm , Incremental algorithm, Border algorithm.

UNIT-III

Clustering Techniques :- Introduction , clustering paradigms , partitioning algorithms, k-Medoid Algorithm, CLARA ,CLARANS , Hierarchical clustering , DBSCAN , BIRCH, CURE, Categorical clustering algorithms , STIRR, ROCK , CACTUS.

UNIT -IV

Decision Trees:-Introduction, Tree construction principal , Best spilt ,splitting indices, splitting criteria , Decision tree construction algorithm, CART, ID3, C4.5 , CHAID , Decision tree construction with presorting , Rainforest , CLOUDS, BOAT .

UNIT-V

Web Mining: - Web mining, Web content mining, Web structure mining, Web usage mining, Textmining, Episode rule discovery for texts, Hierarchy of categories, text clustering.

Books & References:-

1. Arun K Pujari , *Data Mining techniques*, Universities press.
2. Jiaweihan , Michelinekamber , *Data Mining concepts & techniques*, Morgan Kaufmann publisher Elsevier India.
3. Cios , Pedrycz , swiniarski, *Data Mining methods for knowledge Discovery*, Kluwer academic publishers London.

Class: Bachelor of Technology Seventh Semester Computer Science and Engineering
Subject Name: Wireless Sensor Network
Subject Code: CS7TPE02

UNIT- I

Wireless Sensor Network: Introduction, Architecture, Hardware and Software used in Wireless Sensor Network.

UNIT- II

Sensor network application: Motion monitoring, Environmental monitoring, Generic Architecture, Sensor network Evolution.

UNIT- III

Wireless Sensor Network : Design , Goals and Issues , Sensor deployment, Scheduling and coverage issues, self-configuration and topology control, Querying, data collection and processing, Collaborative information processing and group connectivity.

UNIT- IV

Wireless Sensor Routing Protocols: Data Centric, Hierarchical, Location based, Energy efficient routing

UNIT- V

Sensor Network Challenges- Miniaturization, power management, scalability, remote management, usability, standardization and security, System Challenges- Tiny OS, Network Sensor Platforms.

Books & References:-

1. Robert Faludi **Binding** , *Building Wireless Sensor Networks* , **Paperback** Publisher: O'reilly.

2. Zhao Feng, **Guibas** Leonidas, *Wireless Sensor Networks*, Binding: Paperback Publisher: Elsevier India.

3. C. S Raghavendra, Krishna M. Sivalingam, TaiebZnati , *Wireless Sensor Networks*, Binding: Paperback Publisher: Springer/bsp Books.

Class: Bachelor of Technology Seventh Semester Computer Science and Engineering
Subject Name: Web Technologies
Subject Code: CS7TOE01

UNIT-I

Fundamentals of Web, History of the Web, Growth of the Web in post decade, Web function. Security aspects on he web, Computational features encompassing the Web. Working Web Browsers, concepts of search Engines, Searching the Web, Web Servers.

UNIT-II

Internet: - Networks, Client & Server, WWW, URL, HTTP, Internet requirements, Internet Services, Internet Java Script introduction, operators, statements, loops, object manipulation, function, objects, events handler, always, events.

UNIT-III

HTML: - Introduction, cascading style sheets, content positioning HTML content, Downloadable fonts, vising Java Script with positioned content, Layer object, Handling events using localized scripts, Animating images, VB script, Introduction, Adding VB script to Web Range, Working with variables, constants, arrays, objects, conditional statements loop statements, Forms.

UNIT-IV

Active Server Page(ASP)Introduction , Its Internet Information System , A authentication , Basic authentication , NT challenge response , active server page, asp objects , server objects , file system objects , session ,accessing database with an ASP page, create an ODBC ADO connection object, common methods & Properties events , collections ADO record set object.

UNIT-V

XML :- Introduction, TO XML ,XML schemas ,DOM structure model, using XML queries. Building a path , Sharing functions. Introduction of personal home page (PHP) design.

References:

1. Achyut S Goldbole and atul khute, *Web Technology*, Tata McGraw Hill.
2. Gopalan NP Akilandeswari, *Web Technology : A neweloper's perspechive* , PHI.
3. C Xavier, *Web Technology & Design*, Tata McGraw Hill.

3. Y. Barua and D.P. Dayal , Cyber CRIME notorious Aspects of the Humans & net Criminals activity in Cyber World, Dominant Publisher.

4. R.C. Marine , Cyber Crime Impact in the new millennium, Auther press.

5. Y. Barua and D.P. Dayal , Spam Attack, Cyber Stalking & abuse, Dominant publisher.

6. Y. Barua and D.P. Dayal , Frauds & Financial criouses in Cyber space, Dominant publisher.

7. Information Security, NIIT, PHI.

Class: Bachelor of Technology Eighth Semester Computer Science and Engineering
Subject Name: Network Security
Subject Code: CS8TPC01

UNIT-I

Services , Mechanisms ,and Attacks , The OSI Security Architecture , A Model for Network Security , symmetric cipher model , substitution techniques Transposition techniques, Rotor machines , Steganography .

UNIT-II

Block ciphers and the Data Encryption Standard , simplified DES , Block cipher principles , The data Encryption Standard ,The Strength of DES. Differential and Linear Cryptanalysis ,Block Cipher Design principles ,Block Cipher Modes of Operation , Evaluation Criteria for AES The AES cipher , Triple DES , blowfish , RC5, RC4 Stream Cipher ,

UNIT-III

Principles of Public –Key Cryptosystems , Public –Key Cryptosystems , Applications for public –Key Cryptosystems , Requirements for public –Key Cryptosystems , Public –Key Cryptosystems , The RAS Algorithm , Computational Aspects , The Security of RSA , Key management , Distribution of public keys , public –Key Distribution of Secret Keys , Differ –Hellmann Key Exchange,

UNIT-IV

Web Security :Web Security Threats , Web Traffic Security Approaches , SSL Architecture , SSL Record Protocol , Change Cipher Spec Protocol ,Alert Protocol , Handshake Protocol , Cryptographic Computations ,Transport Layer Security , Secure Electronic Transaction ,

UNIT V

Intruders : Intrusion Techniques ,Intrusion Detection , Audit Records , Statistical Anomaly Detection ,Rule –Based Intrusion Detection ,The Base –Rate Fallacy , Distributed Intrusion Detection , Honeypots , Intrusion Detection Exchange Format Firewall Design principles , Firewall Characteristics , Types of Firewalls , Firewall Configurations .

Reference Books :

1. William Stallings, *Cryptography and Network Security* , Principles and Practice.

Class: Bachelor of Technology Seventh Semester Computer Science and Engineering
Subject Name: **Digital Image Processing**
Subject Code: **CS7TOE04**

UNIT- I

Introduction to Image Processing: Overview, Digital Image Representation,Types of Image,Image Processing steps, Application, Digital Imaging Systems: Overview, Physical Aspects of Image acquisition, sampling, Quantization, Image storage and formats.

UNIT-II

Digital Image Transform: Types of Image transform, Basis for transform, Fourier transform, Discrete Cosine transform, sine transform, Walsh transform, Hadamard transform, Haar transform, Slant transform.

UNIT-III

Image Enhancement : Need for Image Enhancement, Image Enhancement operation, Image Enhancement in Spatial Domain, Histogram based Techniques, Spatial Filtering concept, Image smoothing and sharpening in spatial Domain and Frequency Domain.

UNIT-IV

Image Restoration: Introduction to Degradation, types of Image Degradation, Noise Modeling, Image Restoration in presence of Noise: Mean filters,Geometric mean filter, Median filter, Maximum andMinimum filter, Midpoint filter, Band pass filter. Image Restoration Technique: Unconstrained method and constrained method.

UNIT-V

Image Compression: fundamental of Image compression, Compression Algorithm and its types, lossless compression algorithm and lossy compression algorithm.

References Book:

1. Gonzalez and Woods, *Digital Image Processing*, Pearson Education.

2. S.Sridhar, *Digital Image Processing*, Oxford University Press.

3. Jayaraman, Esakkirajan and Veerakumar, *Digital Image Processing*, TMH.

4. Anil Jain, *Fundamentals of Digital Image Processing*, PHI Learning.

5. Sonka, Hlavac and Boyle, *Digital Image Processing and Computer Vision*, Cengage Learning.

Class: Bachelor of Technology Eighth Semester Computer Science and Engineering
Subject Name: Soft Computing
Subject Code: **CS8TPE01**

UNIT-I

Introduction of Soft Computing, Difference between Hard and Soft Computing, Introduction of Artificial Neural Network (ANN), Features of Biological Neural Networks, Biological Neural Network, Performance Comparison of Computer and Biological Neural Network, Historical Development of Neural Network Principles, Benefits of Neural Networks, Basic Elements of Artificial Neural Network, Basic Representation Techniques of Artificial Neural Network (Block Diagram Representation, Signal Flow Graph, Architectural Graph) , Activation Functions, Network Architectures (Single-Layer Feed-forward, Multi-Layer Feed-forward and Recurrent Network), Examples of Artificial Neural Network Systems.

Unit-II

Mendel and McClaren Definition of Learning in the Context of Neural Network, Error Correction Learning, Hebbian Learning, Competitive Learning, Supervised and Unsupervised Learning, Some Basic Artificial Neural Network Models: McCulloch-Pitts Model and Rosenblatt's Perceptron Model, Delta Learning Rule, Widrow-Hoff Learning Rule, Construction of Logic Gates (AND, OR, NOR, NAND, NOT) using Artificial Neural Network, XOR Problem, Tourtzky and Pomerleau solution to the XOR problem, Backpropagation Algorithm, Multilayer Perceptron, Adaline, Madaline.

Unit-III

Introduction of Fuzzy Logic, Crisp Sets, Operations on Classical Sets, Properties of Crisp Sets, Fuzzy Sets, Membership Function, Fuzzy Set Operations, Properties of Fuzzy Sets, Crisp Relations, Operations on Crisp relations, Fuzzy Relation, Operation on Fuzzy Relations, FAM System Architecture, Similarities and Dissimilarities between Fuzzy Logic and Neural Networks.

Unit-IV

Introduction to Genetic Algorithms(GA), Genetic Algorithms, Flowchart of GA, Some Genetic Representations (Binary Representation, Octal Representation, Hexadecimal Representation), Selection, Genetic Operators, Mutation, Brief Introduction to Evolutionary Programming, Brief Introduction to Swarm Intelligence.

Unit-V

Introduction to Application of ANN, Direct Application (Travelling Salesman Problem), Application Areas (NETtalk, Phonetic Typewriter, Recognition of Handwritten Digits), Neural Truck Backer-Upper Control System, Fuzzy Truck Backer-Upper Control System, Comparison of Fuzzy and Neural Truck Backer-Upper Control Systems.

Recommended Books

Text Book:

1. S. Haykin, *Neural Networks : A Comprehensive Foundation*, Second Edition, Prentice Hall International, 1999.

Other Reference:

1. B. Yegnanarayana, *Artificial Neural Networks*, Nineteenth Printing, PHI Learning Private Limited, 2012.
2. G.J. Klir and B. Yuan, Fuzzy Sets and Fuzzy Logic : Theory and Applications, Third Edition, PHI, 2000.
3. B. Kosko, *Neural Networks and Fuzzy Systems : A Dynamical Systems Approach to Machine Intelligence*, Sixth Edition, PHI, 2000.

Recommended Books

Text Book:

1. S. Haykin, *Neural Networks : A Comprehensive Foundation*, Second Edition, Prentice Hall International, 1999.

Other Reference:

1. B. Yegnanarayana, *Artificial Neural Networks*, Nineteenth Printing, PHI Learning Private Limited, 2012.
2. G.J. Klir and B. Yuan, *Fuzzy Sets and Fuzzy Logic : Theory and Applications*, Third Edition, PHI, 2000.
3. B. Kosko, *Neural Networks and Fuzzy Systems : A Dynamical Systems Approach to Machine Intelligence*, Sixth Edition, PHI, 2000.

Department of Computer Science & Engineering, IT, GGV, Bilaspur (Chhattisgarh) India

Class: Bachelor of Technology Eighth Semester Computer Science and Engineering
Subject Name: **Enterprise Resource Management**
Subject Code: **CS8TOE01**

UNIT-I

ERP: An Overview, Enterprise – An Overview, Benefits of ERP, ERP-I, ERP-II. Function of Business Organizations: Business Models, Functions and Integrated View of ERP for Accounting Financial Management, Marketing and Sales Management, Manufacturing Managements, Human Resource Management etc., Sales Order Processing.

UNIT-II

Business Functions and Processes ,Mainstream, Supportive and Administrative Processes in Enterprise, ERP and Related Technologies- Business Process Reengineering (BPR) Characteristics, Building Steps, Difference Between Business Improvement and BPR, Types of BPR etc. Electronic Commerce, Brief Introduction of Knowledge Based System, AI and Expert System, Networking and Multi Tier Architecture. Data Warehousing, Data Mining, OLAP, SCM.

UNIT-III

Management Information System: MIS, DSS,EIS and ESS, Data & Information, Levels of Management, Characteristics of Information, Information Attributes, Quality Issues of Information Prevention of Misuse of Information, etc.

UNIT-IV

Information and Planning: MRP, MRP-II, Forecasting and it's Varies Aspects, Qualitative and Quantitative Forecasting. Various Methods in Forecasting, Scheduling Like Single Machine/Job Scheduling etc.

UNIT-V

ERP Implementation: Lifecycle, Software Development Life Cycle, Pre-Evaluation Schemes, Post-Implement Issues, Hidden Costs, , Implementation Methodology, Vendors, Case Studies.

Text Books

1. Leon Alexis, *Enterprise Resource Planning*, McGraw-Hill.

2. Kenneth C. Laudon, J. P. Laudon, *Management Information Systems*, Pearson Education

Reference Book :

1. V.K. Garg and N K Venkitakrishnan, *Enterprise Resource Planning – Concepts and Practice*, PHI.
2. Jerome Kanter, *Management Information Systems* , Prentice-Hall.
3. W.S. Jawadekar, *Management Information System*, Tata McGraw-Hill.
4. Joseph A Brady, Ellen F Monk, Bret Wagner , *Concepts in Enterprise Resource Planning*, Cengage Learning

Class: Bachelor of Technology Eighth Semester Computer Science and Engineering
Subject Name: **Cloud Computing**
Subject Code: **CS8TOE02**

UNIT-I [Introduction]

Introduction to Cloud Computing, Evolution of Cloud, Cloud Computing Characteristics, Benefits and Challenges of Cloud Computing, Emergence of Cloud Computing, Cloud Based Service Offerings, Cloud Computing Application.

UNIT-II [Cloud Models]

Introduction to Cloud Models, Cloud Models: Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud.

UNIT-III [Standard & Security]

Introduction to Cloud Standards, Cloud Security Challenges, Cloud Data Security, Network Security, Host Security, Database Management.

UNIT-IV [Cloud Services]

Introduction to Service,Infrastructure as a Service(IaaS),Platform as a Service(PaaS),Software as a Service(SaaS), Storage as a Service(StaaS), Database as a Service(DaaS), Process as a Service(PraaS), Security as a Service(SecaaS), Different Security issues of Cloud Computing.

UNIT-V [Virtualization]

Introduction, Virtualization Architecture, Types of Virtualization, Pros and Cons of Virtualization, Virtual Machine, Types of Virtual Machine.

Text Book:

1. Rajkumar Byyya, James Broberg, Andrzej M. Goscinski, *Cloud Computing: Principles and Paradigms*, Wiley.
2. M.N. Rao, *Cloud Computing* PHI.
3. Toby Velte, Anthony Vote and Robert Elsenpeter, *Cloud Computing: A Practical Approach*, McGraw Hill.

Class: Bachelor of Technology Eighth Semester Computer Science and Engineering
Subject Name: Introduction to Computational Intelligence
Subject Code: **CS8TPE02**

UNIT-I [Introduction to Computational Intelligence]

Computational Intelligence Paradigm [ANN, Evolutionary Computing, Swarm Intelligence, Fuzzy Systems].

Unit-II [Artificial Neural Network]

The Artificial Neuron [Calculating the Net Input Signal, Activation Functions, Artificial Neuron Geometry], Artificial Neuron Learning [Augmented Vectors, Gradient Descent Learning Rule, Widrow-Hoff Learning Rule, Generalized Delta Learning Rule, Error-Correction Learning Rule].

Unit-III [Introduction to Evolutionary Computing]

Representation of Solution-The Chromosome, Fitness function, Initial Population, Selection Operators [Random Selection, Proportional Selection, Tournament Selection, Rank-Based Selection, Elitism, Reproduction Operators, General Evolutionary Algorithms.

Unit-IV [Genetic Algorithms]

Random Search, General Genetic Algorithm, Chromosome Representation, Cross-Over, Mutation, Island Genetic Algorithm, Routing Optimization Application.

Unit-V [Genetic Programming]

Chromosome Representation, Initial Population, Fitness Function, Cross-Over Operator, Mutation Operators, Building-Block Approach to Genetic Programming.

Recommended Books

Text Book:

1. S. Haykin, *Neural Networks : A Comprehensive Foundation*, Second Edition, Prentice Hall International, 1999.

Other Reference:

1. B. Yegnanarayana, *Artificial Neural Networks*, Nineteenth Printing, PHI Learning Private Limited, 2012.
2. G.J. Klir and B. Yuan, Fuzzy Sets and Fuzzy Logic : Theory and Applications, Third Edition, PHI, 2000.

3. B. Kosko, *Neural Networks and Fuzzy Systems - A Dynamical Systems Approach to Machine Intelligence*, Sixth Edition, PHI, 2000.