School of Engineering and Technology

GURU GHASIDAS VISHWAVIDYALAYA

A Central University established by the Central University Act 2009 No. 25 of 2009

Bilaspur (C.G) 495009.

INFORMATION TECHNOLOGY

STUDENT'S HANDBOOK

2021-22

Bachelor of Technology Programme

DEPARTMENT OF INFORMATION TECHNOLOGY

Preface

The School of Engineering & Technology 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 Institute, 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 Institute 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 Institute on an average, admits around 400 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. Presently, 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 Institute revises its Undergraduate and Postgraduate Programmes syllabi from time to time. Institute follows semester system of teaching (odd- July - December and even- January – June).

Ours 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 the School of Engineering & Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur. We wish all our students a very bright future and successful career.

Dean (SOS, Engg. & Tech.)

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ABOUT THE DEPARTMENT

The Department has been conceived with the ambitious objectives of developing professional expertise and skilled manpower in Information Technology (IT) and related areas. This will contribute in enabling the country to exploit efficiently emerging opportunities, and meet economic challenges being thrown up by the rapid global IT revolution, which is influencing virtually every area of development and social activity. The syllabi and courseware are designed to be flexible and wide-ranging, incorporating the cutting edge as well as ensuring a firm grasp of core fundamentals. A modular course design, along with several opportunities for industry training, gives students the freedom to tailor their learning experience. The department is committed to establish facilities for education and training in the field of IT for students and faculty members. The alumni students of this department are performing well in different multinational companies (MNC's). Some of our students are performing well in the competitive exams of international/National repute like GRE, GATE, NET and CAT etc.

Thrust Area

The Department's current research thrusts include:

Image and Video Processing,
Computer Vision
Machine Learning
Wireless Sensor Networks
Network Security
Mobile Ad Hoc Network
Embedded System
Material Science
Text Mining, Data Mining
Internet of Things
Semantic Web
Data Mining
Object oriented programming
Biomedical Signal Processing
Information Security

Students Achievements of Department :

A. Number of Students Qualified on Various Exams :

Name of Exam	No. of Students
GATE	02
Placed in Company	**06**

B. Courses Intake

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

- **FACULTY OF THE DEPARTMENT**

Name	Qualification	Designation	Contact	Specialization
Dr. Rohit Raja	Ph.D.	Associate Professor & Head	drrohitraja1982@gmail.com 70005-59696	Image and Video Processing, Computer Vision & Machine Learning
Dr. Amit Khaskalam	Ph.D.	Assistant Professor	amitkumar.k@ggu.ac.in 94252-80380	Embedded System, Material Science
Dr. Rajesh Mahule	Ph.D.	Assistant Professor	rmahule@rediffmail.com Contact No.- 94252-30522	Semantic Web, Machine Learning, Data Mining and object oriented programming
Dr. Santosh Soni	Ph.D.	Assistant Professor	santoshsoni.77@gmail.com Contact No.- 88711-40312	Wireless Sensor Networks, Network Security, Mobile Ad Hoc Network
Mr. Abhishek Jain	M.Tech.	Assistant Professor	ajain.nit@gmail.com Contact No.- 89626-96827	Biomedical Signal Processing, Image Processing
Mr. Agnivesh Pandey	M.Tech.	Assistant Professor	agnitu1984@gmail.com Contact No.- 96912-85190	Image Processing
Mr. Pankaj Chandra	M.Tech.	Assistant Professor	Pankaj2684@gmail.com 9981111983	Wireless Sensor Networks
Mr. Suhel Ahamed	M.Tech.	Assistant Professor	suhel_starmail@yahoo.co.in 91656-78692	Information Security, cloud computing, distributed systems, block chain, IoT
Mr. Deepak Kant Netam	M.Tech.	Assistant Professor	deepaknetam@gmail.com 97554-46005	Information Technology
Mr. Anand Prakash Rawal	M.Tech.	Assistant Professor	rawal96@gmail.com 94076-55455	Sensor Network and IoT

Mrs. Akanksha Gupta	M.Tech.	Assistant Professor	akanksha.me2011@gmail.com 97701-47322	Mobile ad Hoc Network, ITC
Mr. Amit Dewangan	M.Tech.	Assistant Professor	amit.nitrr@gmail.com 96911-68068	Text Mining, Data Mining
Mrs. Aradhana Soni	M.Tech.	Assistant Professor	soni.aradhana@gmail.com 97555-10440	Information Security, Image Processing

B.TECH. ORDINANCE

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

(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
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).

10.7.7 *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 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

$$[SGPA]_i = \frac{[C_1G_1 + C_2G_2 + \ldots\ldots]_i}{[C_1 + C_2 + \ldots\ldots]_i} = \frac{[\sum C_jG_j]_i}{[\sum C_j]_i} = \frac{N_i}{D_i}$$

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.

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 specified in sub-clause (h) of clause	Cancel the University Examination of all subjects registered by the candidate during that semester only.

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 RAGGING

ABOUT 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 speci fi 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 financial 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:-

8.1 At 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 benefits

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 identified, 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, affiliated 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 affiliation/ 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

UNIVERSITY TELEPHONE DIRECTORY

Administration

S.No.	POSITION	NAME	PHONE NO. (07752)
01.	Vice Chancellor(Acting)	Prof. Alok Chakrawal	260283, 260353
02.	Registrar (Acting)	Prof. Shailendra Kumar	260209
03.	Dean Student Welfare (DSW)	Dr. M.N.Tripathi	260204
04.	Dean, SoS(Engg. & Tech.)	Dr. T.V.ARJUNAN	09894332446
05.	HOD (Information Technology)	Dr. Rohit Raja	07000559696
06.	HOD (Computer Science & Engineering)	Dr. Alok Kumar Singh Kushwaha	08090631394
07.	HOD (Industrial & Production Engineering)	Prof. Sharad Chandra Shrivastsvs	09894332446
08.	HOD (Chemical Engineering)	Dr. Anil Chandraker	09300105586
09.	HOD (Mechanical Engineering)	Dr. T.V.ARJUNAN	09894332446
10.	HOD (Civil Engineering)	Mr. Ashish Parashar	09425502572
11.	HOD (Electronics & Comm.)	Dr. Soma Das	06266381763

Other Useful Phone No.:

S. No.	POSITION	PHONE NO.
1	Police Station, Koni	07752-260039
2	Post Office, Koni	07752-260032
3	Punjab National Bank, Koni	07752-260034
4	Bank of India	07752-260073
5	State Bank of India, Koni	08889179998

COURSE STRUCTURE & SYLLABUS

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
FIRST YEAR, INFORMATION TECHNOLOGY
SEMESTER -I

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	2
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

SEMESTER -II

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

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
SECOND YEAR, INFORMATION TECHNOLOGY
SEMESTER -III

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT203TES06	ANALOG ELECTRONIC CIRCUITS	3	0	0	30	70	100	3
2	IT203TPC01	DATA STRUCTURE & ALGORITHMS	3	0	0	30	70	100	3
3	IT203TPC02	DIGITAL ELECTRONICS	3	0	0	30	70	100	3
4	IT203TBS05	MATHEMATICS-III	3	1	0	30	70	100	4
5	IT203TPC03	OBJECT ORIENTED PROGRAMMING	3	1	0	30	70	100	4
PRACTICAL									
1	IT203PES06	ANALOG ELECTRONIC CIRCUITS LAB	0	0	4	30	20	50	2
2	IT203PPC01	DATA STRUCTURE LAB	0	0	4	30	20	50	2
3	IT203PPC02	DIGITAL ELECTRONICS LAB	0	0	4	30	20	50	2
4	IT203PPC03	OBJECT ORIENTED PROGRAMMING LAB	0	0	4	30	20	50	2
TOTAL CREDITS									**25**
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									

SEMESTER -IV

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT204TPC01	DISCRETE MATHEMATICS	3	1	0	30	70	100	4
2	IT204TPC02	COMPUTER ORGANIZATION & ARCHITECTURE	3	0	0	30	70	100	3
3	IT204TPC03	OPERATING SYSTEMS	3	0	0	30	70	100	3
4	IT204TPC04	DESIGN & ANALYSIS OF ALGORITHMS	3	0	0	30	70	100	3
5	IT204THS02	MANAGEMENT 1 – MANAGEMENT PROCESS AND ORGANIZATIONAL BEHAVIOUR	3	0	0	30	70	100	3
PRACTICAL									
1	IT204PPC01	COMPUTER ORGANIZATION & ARCHITECTURE LAB	0	0	4	30	20	50	2
2	IT204PPC02	OPERATING SYSTEMS LAB	0	0	4	30	20	50	2
3	IT204PPC03	IT WORKSHOP	1	0	2	30	20	50	2
TOTAL CREDITS									**22**
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER -V

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT05TES01	SIGNALS & SYSTEMS	3	0	0	30	70	100	3
2	IT05TPC01	DATABASE MANAGEMENT SYSTEMS	3	0	0	30	70	100	3
3	IT05TPC02	FORMAL LANGUAGE & AUTOMATA THEORY	3	0	0	30	70	100	3
4	IT05TPC03	OBJECT ORIENTED PROGRAMMING	2	0	0	30	70	100	2
5		ELECTIVE – I	3	0	0	30	70	100	3
PRACTICAL									
1	IT05PPC01	DATABASE MANAGEMENT SYSTEMS LAB	0	0	4	30	20	50	2
2	IT05PPC02	OBJECT ORIENTED PROGRAMMING LAB	0	0	4	30	20	50	2
3	IT05PPE01	ELECTIVE – I LAB	0	0	4	30	20	50	2
4	IT05PMC01	CONSTITUTION OF INDIA/ ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	-	-	2	-	-	-	0
TOTAL CREDITS									**20**
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									

SEMESTER -VI

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT06TPC01	COMPILER DESIGN	3	0	0	30	70	100	3
2	IT06TPC02	COMPUTER NETWORKS	3	0	0	30	70	100	3
3		ELECTIVE – II	3	0	0	30	70	100	3
4		ELECTIVE – III	3	0	0	30	70	100	3
5		OPEN ELECTIVE - I	3	0	0	30	70	100	3
PRACTICAL									
1	IT06PPC01	COMPUTER NETWORKS	0	0	4	30	20	50	2
2	IT06PPR01	PROJECT - I	0	0	6	30	20	50	3
TOTAL CREDITS									20
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
FOURTH YEAR, INFORMATION TECHNOLOGY
SEMESTER -VII

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT07TPC01	CYBER SECURITY	3	0	0	30	70	100	3
2	IT07TPE4X	ELECTIVE-IV	3	0	0	30	70	100	3
3	IT07TPE5X	ELECTIVE-V	3	0	0	30	70	100	3
4	IT07TPE5X	OPEN ELECTIVE - II	3	0	0	30	70	100	3
1	IT07PPC21	PROJECT-II	0	0	12	60	40	100	6
TOTAL CREDITS									18
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									

SEMESTER -VIII

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT08TPC6X	ELECTIVE-VI	3	0	0	30	70	100	3
2	IT08TOE3X	OPEN ELECTIVE-III	3	0	0	30	70	100	3
3	IT08TOE4X	OPEN ELECTIVE-IV	3	0	0	30	70	100	3
1	IT06PPC31	PROJECT-III	0	0	18	60	40	100	9
TOTAL CREDITS									18
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									

Syllabus

Semester – I & II

SYLLABUS	(SEMESTER-I)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	MA201TBS01	L	T	P	CT-1	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; Cayley-Hamilton 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
Subject Code:	CY201TBS02/ CY202TBS04	L	T	P	CT-1	CT-II	TOTAL	70	100	04
Subject:	CHEMISTRY	3	1	-	15	15	30			

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. 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-1	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
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CM201TES03 / CM202TES05							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, Concrete-quality 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-1	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
		L	T	P	IA	MSE	TOTAL			
Subject Code:	CY201PBS01 / CY202PBS02	0	0	2	30	-	30	20	50	01
Subject:	CHEMISTRY LAB									

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	20	50	1
Subject Code:	CE2011ES01/ CE202PES04									
Subject:	ENGG MECHANICS LAB	-	-	2	30	--	30			

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
Subject Code:	MA202TBS03	L	T	P	CT-1	CT-II	TOTAL	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 non-homogenous 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
		L	T	P	CT-1	CT-II	TOTAL	70	100	04
Subject Code:	PH201TBS02 / PH202TBS04									
Subject:	PHYSICS	3	1	-	15	15	30			

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-1	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
Subject Code:	IT201TES02 / IT202TES05	L	T	P	CT-1	CT-II	TOTAL	70	100	02
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 cyber-criminals.

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.

SYLLAUS	**(SEMESTER-II)**	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject Code:	EN202THS01	3	0	-	15	15	30			
Subject:	ENGLISH COMMUNICATION									

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
		L	T	P	IA	MSE	TOTAL			
Subject Code:	ME201PES01/ ME202PES03									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
		L	T	P	IA	MSE	TOTAL			
Subject Code:	ME201PES02 / ME202PES04									2
Subject:	WORKSHOP TECHNOLOGY & PRACTICES	1	0	2	30	--	30	20	50	

Course Learning Objectives:

• To impart student knowledge on various hand tools for usage in engineering applications.
• Be able to use analytical skills for the production of components.
• Design and model different prototypes using carpentry, sheet metal and welding.
• Make electrical connections for daily applications.
• To make student aware of safety rules in working environments.

Course Content:
Lectures & videos:
1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods (3 lectures)
2. CNC machining, Additive manufacturing
3. Fitting operations & power tools
4. Electrical &Electronics
5. Carpentry
6. Plastic moulding, glass cutting
7. Metal casting
8. Welding (arc welding & gas welding), brazing

Textbooks/References:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishersprivate limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu, "Manufacturing Technology – I" Pearson Education, 2008. (iv)Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
4. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata Mc-Graw Hill House, 2017.

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

• Make half lap joint, Dovetail joint and Mortise &Tenon joint
• Produce Lap joint, Tee joint and Butt joint using Gas welding
• Prepare trapezoidal tray, Funnel and T-joint using sheet metal tools
• Make connections for controlling one lamp by a single switch, controlling two lamps by a single switch and stair case wiring

SYLLABUS	(SEMESTER-II)	Periods/ Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
Subject Code:	EC201PES03/ 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

Syllabus

Semester - III

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
SECOND YEAR, INFORMATION TECHNOLOGY
SEMESTER III
EFFECTIVE FROM SESSION 2021-22

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT203TES06	ANALOG ELECTRONIC CIRCUITS	3	0	0	30	70	100	3
2	IT203TPC01	DATA STRUCTURE & ALGORITHMS	3	0	0	30	70	100	3
3	IT203TPC02	DIGITAL ELECTRONICS	3	0	0	30	70	100	3
4	IT203TBS05	MATHEMATICS-III	3	1	0	30	70	100	4
5	IT203TPC03	OBJECT ORIENTED PROGRAMMING	3	1	0	30	70	100	4
PRACTICAL									
1	IT203PES06	ANALOG ELECTRONIC CIRCUITS LAB	0	0	4	30	20	50	2
2	IT203PPC01	DATA STRUCTURE LAB	0	0	4	30	20	50	2
3	IT203PPC02	DIGITAL ELECTRONICS LAB	0	0	4	30	20	50	2
4	IT203PPC03	OBJECT ORIENTED PROGRAMMING LAB		0	4	30	20	50	2
TOTAL CREDITS									**25**

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT203TES06	3	0	0	3 HOURS	30	70	3

ANALOG ELECTRONIC CIRCUITS

Course Objective

1. To apply concepts for the design of low frequency Amplifiers
2. To apply concepts for the design of high frequency Amplifiers
3. To analyze the effects of negative feedback on amplifier circuits.
4. To analyze and determine the different oscillator circuits for waveform Generation
5. To apply concept of the operation of various types of power amplifier circuits.
6. To apply concept of Millers Theorem.

UNIT- I

Low frequency transistor, amplifier, graphical analysis of CE Amplifier, h-parameter models for CB, CE, CC configurations and their interrelationship, analysis and comparison of the three configurations, linear analysis of transistor circuits, Miller's Theorem: Cascading, simplified models and calculation of CE and CC Amplifiers, effect of emitter resistance in CE amplifiers, cascade amplifiers, Darlington pair, analysis of single stage FET amplifiers-CS and CD configuration.

UNIT II

High frequency transistor amplifier, CE hybrid pi model, validity and parameter variation, current gain with resistive load, frequency response of a single stage CE amplifier, gain bandwidth product, CC stage high frequencies, multistage amplifier, classification, distortion in amplifiers, frequency response, bode plots, step response, pass band of cascaded stages, response of a two stage RC coupled amplifier at low and high frequencies, sources of noise in transistor circuits, noise figure.

UNIT III

Feedback Amplifiers: Classification, feedback concept, ideal feedback amplifier, properties of negative feedback amplifier topologies: method of analysis of feedback amplifier, voltage series feedback, voltage series feedback pair, current series, current shunt, voltage shunt feedback, effect of feedback on amplifier bandwidth and stability.

UNIT IV

Large Signal/power amplifier, classification, large signal amplifier characteristics, class A amplifiers, class A amplifier with direct coupled resistive load, transformer coupled class A amplifier, class A push pull amplifiers, class B amplifiers, transformer coupled push pull class B amplifier, complementary symmetry push pull class B amplifier, class AB amplifier, class C amplifier, Harmonic Distortion, Push Pull Amplifiers, Cross over Distortion.

UNIT V

Oscillator: Sinusoidal oscillator, phase shift oscillator, Wien bridge oscillator, Resonant circuit oscillator, LC Collpit, LC Hartley, Amplitude, Frequency, and phase stability analysis of all oscillators. General form of oscillator configuration, crystal oscillator, tuned Amplifiers, classification of tuned

amplifier, analysis of single and double tuned amplifiers, stagger tuned amplifier.

SUGGESTED TEXT BOOKS:
1. Integrated Electronics, Millman & Halkias, TMH
2. Microelectronics, Millman & Grabel, TMH

REFERENCE BOOKS:
1. Electronic Device & Circuits, David A Bell, PHI
2. Electronic Device & Circuits Theory, Boylestad & Nashelsky, PHI

Course Outcomes
1. Design and Implement various transistors models
2. Design and Implement various amplifier circuits
3. Design sinusoidal and non-sinusoidal oscillators.
4. Design different types of Feedback Circuits
5. Analyze different types of power amplifiers.
6. Compare various transistors configuration.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT203TPC01	3	0	4	3 HOURS	30	70	3

DATA STURCTURE & ALGORITHMS

Course Objective
- CO1 - To impart the basic concepts of data structures and algorithms and understand concepts about searching and sorting techniques.
- CO2 - To understand basic concepts about Linked lists and master the implementation of linked data structures.
- CO3 - To understand basic concepts about stacks and queues.
- CO4 - To understand basic concepts about Tree.
- CO5 - To understand basic concepts about Graph and be familiar with some graph algorithms such as shortest path and minimum spanning tree.

Course Outcome
Upon completion of this course, the students will be able to
- Student will be able to choose appropriate data structure as applied to specified problem definition.
- Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
- Students will be able to use linear and non-linear data structures like stacks, queues, linked list etc.

UNIT- I
Introduction: Basic Terminology, Definition of Data Structure, Types of Data Structure, Operation on Data Structure, **Arrays:** Array Definition, Representation of Arrays: Row Major Order, and Column Major Order.
Searching and Sorting: Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort, Binary Search, Linear Search.

UNIT II
Linked lists: Definition, Representation and Implementation of Singly Linked Lists, Traversing and Searching of Linked List, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly Linked List, Circularly Linked List.

UNIT III
Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.,
Queue: Array and linked representation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Deques.

UNIT IV

Trees: Basic Technology , Binary Tree , Binary tree representation , Algebraic Expressions , Complete Binary Tree, Extended Binary Tree, Full Binary Tree, Array and linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Binary search trees (BST), Insertion and deletion in BST, AVL trees, Heap and heap sort.

UNIT V

Graph: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Weighted Graph, Sequential Representations of Graphs, Adjacency Matrices, Adjacency List, Path Matrices, Linked Representations of Graphs, Graph Traversal - DFS, BFS, Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm, Spanning Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm.

References books:

1. Lipschutz, "Data Structures with C" Schaum's Outline Series, TMH.
2. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd.
3. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education Asia.
4. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd.
5. K Loudon, "Mastering Algorithms with C", Shroff Publisher & Distributors Pvt. Ltd.
6. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill.
7. G A V Pai, "Data Structures and Algorithms", TMH.
8. G.S.Baluja, "Data Structures through C", Dhanpat Rai & Co.
9. Yashavant Kanetkar, "Data Structure Through C", BPB Publication.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT203TPC02	3	0	0	3 HOURS	30	70	3

DIGITAL ELECTRONICS

Course Objectives:

1. To understand the basic knowledge of digital logic and components.

2. Design of combinational circuits and sequential circuits.

3. Application of knowledge to understand digital electronics circuits.

4. To impart how to design Digital Circuits.

Course Outcome (COs):

At the end of this course, students will demonstrate the ability to

- Convert different type of codes and number systems which are used in digital communication and computer systems.
- Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.
- Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.
- Design different types of with and without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints.
- Apply the fundamental knowledge of analog and digital electronics to get different types analog to digitalized signal and vice-versa converters in real world with different changing circumstances.
- Assess the nomenclature and technology in the area of memory devices and apply the memory devices in different types of digital circuits for real world application.

UNIT 1 - Fundamentals of Digital systems and logic families

Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive OR operations, Boolean algebra, examples of IC gates, number systems- binary, signed binary, octal, Hexadecimal number, binary arithmetic, Once's and two's complements, arithmetic codes, error detecting, and correcting codes, characteristics of digital ICs, digital logic families, TTL, schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT 2 - Combinational Digital Circuits

Standard representation for logic function, K map representation, simplification of logic functions, using K map, minimization of logical functions. Don't care conditions, Multiplexes, De- Multiplexes, / Decoders, Adders, Sub tractors, BCD arithmetic, carry look ahead, serial adders, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker, / generator, code converters, priority encoders, decoders/ drivers, for display devices, Q-M method of function realization.

UNIT 3 - Sequential circuits and systems

A 1 bit memory, the circuits properties, of Bi-stable latch, the clocked SR flip flop, JK flip flops, T flip flops, D flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counter's design using flip flops, special counter IC's, Asynchronous sequential counters, applications of counters.

UNIT 4 — A/D and D/A converters
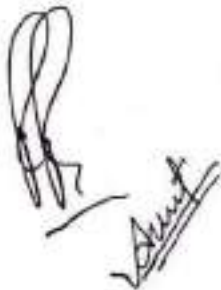
Digital to analog converters: weighted registers/ converters, R-2R Ladder, D/A converters, specifications for D /A converters, examples of D /A converter ICs, sample and hold circuits, Analog to digital converters: quantization and encoding, parallel comparator, A/D converter, successive approximation A/D converter, counting A/D converter, dual slop A / D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs.

UNIT 5 - Semiconductor memories and Programmable logic devices

Memory organization and operation, expanding memory size, classification and characteristics of memories, Sequential memories, read-only memory(ROM), read and write memory (RAM), content addressable memory (CAM) , charge coupled device memory (CCD) , commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS) , Field Programmable Gate Array (GPGA).

Text / References:

1. M_M Mano, "Digital logic and Computer design", Pearson Education India.

2. R. P. Jain, " Modern Digital Electronics" , McGraw Hill Education.

3. A kumar, "Fundamentals of Digital Circuits ", Prentice Hall India.

4. S Salivahanan and S A.rivazhagan " Digital Circuits and Design" OXFORD University Press.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT203TBS05	3	1	0	4 HOURS	30	70	4

Course Objective

1. To provide knowledge of various methods for numerical solutions of algebraic and transcendental equations, simultaneous equation and ordinary differential equations.

2. To provide a thorough understanding of interpolation and numerical differentiation and integration.

Mathematics - III

UNIT- I 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 or moments

UNIT- II 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.

UNIT- III 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.

UNIT- IV Numerical Differentiation and Integration: - Numerical Differentiation Newton's forward and Backward difference interpolation form ul a. Maximn and Minima of aTabulated function, Numerical Integration :-Trapezoidal 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.

UNIT- V Numerical solution of ordinary differential equation: Taylor series meth od, 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.

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.

Reference Books:
5. Rajaraman V Computer Oriented Numerical Methods
6. P. Kandasamy K. Thiagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
7. S.S. Sastry, Introduction methods of Numerical Analysis, PHI, 4th Edition, 2005.
8. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

Course Outcome:

After completion of this course students will be able to find Numerical solution of various equations, which may be arising due to mathematical modelling based on engineering problems.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT203TPC03	3	1	0	3 HOURS	30	70	4

Object Oriented Programming

Course Objectives:

1. To understand and Practice Programming Construct: Variable, Operators, Control Structures, Loop, Functions, learn the concept of class and object and develop classes for simple applications with C++.
2. To learn how to implement Constructors, copy constructors and destructor functions.
3. To learn how to overload functions and operators in C++.
4. To learn how to design C++ classes for code reuse and perform inheritance.
5. To learn working with files and handle exceptions in program.

UNIT I

Overview of C++ : Object oriented programming, Concepts, Advantages, Usage. C++ Environment: Program development environment, the language and the C++ language standards. Introduction to various C++ compilers, C++ standard libraries, Prototype of main() function, Data types. C++ as a superset of C, New style comments, main function in C++, meaning of empty argument list, function prototyping, default arguments and argument matching.

User defined data types: enumerated types, use of tag names, anonymous unions, scope of tag names Classes & Objects : Classes, Structure & Classes, Inline Function, Scope Resolution operator, Static Class Members: Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment. Friend Function, Friend Classes

UNIT II

Array, Pointers References & The Dynamic Allocation Operators: Array of Objects, Pointers to Object, Type Checking C++ Pointers, The This Pointer, Pointer to Derived Types, Pointer to Class Members, References: Reference Parameter, call by reference and return by reference Passing References to Objects, Returning Reference, Independent Reference, C++'S Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects.

Constructor & Destructor: Introduction, Constructor, access specifies for constructors, and instantiation, Parameterized Constructor, Multiple Constructor in A Class, Constructor with Default Argument, Copy Constructor, Destructor.

UNIT III

Overloading as polymorphism: Function & Operator Overloading : Function Overloading, Overloading Constructor Function Finding the Address of an Overloaded Function, Operator Overloading: Creating A Member Operator Function, Creating Prefix & Postfix Forms of the Increment & Decrement Operation, Overloading The Shorthand Operation (i.e., +=, -= etc). Operator Overloading Restrictions, Operator Overloading Using Friend Function, Overloading Some Special Operators like [ ], ( ), -, Comma Operator, Overloading << etc.

UNIT IV

Inheritance : Base Class Access Control, Inheritance & Protected Members, Protected Base Class Inheritance, Inheriting Multiple Base Classes, Constructors, Destructors & Inheritance, When

Constructor & Destructor Function are Executed, Passing Parameters to Base Class Constructors, Granting Access, Virtual Base Classes .

Virtual Functions & Polymorphism: Virtual Function, Pure Virtual Functions, Early Vs. Late Binding.

UNIT V

Working with files: File & stream. Opening and closing a file, read ( ) and write ( ) functions, detecting end of file.

Templates and Exception Handling: Exception handling in C++, try, throw, catch sequence, multiple catch blocks, uncaught exceptions, catch-all exception handler

Course Outcomes:-

1. Understand the C++ language features. Use the control structure and data types in C++. Write simple programs using classes and objects.
2. Understand the concepts of arrays, pointers, references and use of dynamic allocation operators. Write simple programs to implement Constructor & destructor concepts.
3. Understand the concept of Operator overloading and type conversion.
4. Understand the concepts of inheritance and virtual functions.
5. Understand file handling concepts, generic class and I/O exception handling.

Reference Books:

Object Oriented Programming with C++ by M. P. Bhave, S. A. Patekar, Pearson Education

Object Oriented Programming With C++ by E. Balaguruswamy.

Object Oriented Programming in turbo C++ by Robert Lafore.

Programming with C++ by D. Ravichandan.

Programming with C++ (SOS) by Hubbard.
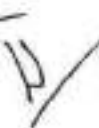
SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT203PES06			4	3 HOURS	30	20	2

Course Objective

• Understand the circuit configurations and connectivity of Amplifiers and Study of frequency response
• Design and test of analog circuits using OPAMPs
• Understand the feedback configurations of transistor and OPAMP circuits
• Use of circuit simulation for the analysis of electronic circuits.

List of Experiment

1. RC coupled amplifier
2. Darlington Emitter Follower
3. Voltage Series Feedback Amplifier
4. RC Phase shift Oscillator
5. Hartley & Colpitt's Oscillator
6. Clipping circuits
7. Clamping circuits
8. Op-Amp applications
9. ZCD & Schmitt trigger
10. Full wave Precision Rectifier
11. Voltage Regulator
12. Digital-Analog Converter
13. Analog-Digital Converter

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT203PPC01	0	0	4	4 HOURS	30	20	2

DATA STURCTURE LAB

Course Objective
The course is designed to develop skills to design and analyze simple linear and nonlinear data structures. It strengthens the ability to the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

Course Outcome
At the end of this lab session, the student will
1. Design programs using a variety of data structures such as Stacks, Queues, Array, Binary Trees, and Linked List.
2. Analyze and implement various kinds of searching and sorting techniques.
3. Have practical knowledge on the applications of data structures.

List of Practical's

1. Write a C program for declaration, assignment, and accessing the arrays elements.
2. Write a C Program to Find Average Marks obtained by a class of 30 Students in a Test.
3. Write a C program to perform Array Insertion Operation.
4. Write a C program to perform Array Deletion Operation.
5. Write a C program to implement Linear Search.
6. Write a C program to implement Binary Search.
7. Write a C program to implement Bubble Sort.
8. Write a C program to implement Merging operation.
9. Write a program in C to create and display Singly Linked List.
10. Write a program in C to create a singly linked list of n nodes and count the number of nodes.
11. Write a program in C to insert a new node at the beginning of a Singly Linked List.
12. Write a program in C to insert a new node at the end of a Singly Linked List.
13. Write a program in C to insert a new node after a given location of Singly Linked List.
14. Write a program in C to delete first node of Singly Linked List.
15. Write a program in C to delete the last node of Singly Linked List.
16. Write a program in C to delete a node from the middle of Singly Linked List.
17. Write a program in C to search an existing element in a singly linked list.
18. Write C programs to implement the stack push operation using an array.
19. Write C programs to implement the stack pop operation using an array.

References books:
10. Lipschutz, "Data Structures with C" Schaum's Outline Series, TMH.
11. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd.

12. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education Asia.
13. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd.
14. K Loudon, "Mastering Algorithms with C", Shroff Publisher & Distributors Pvt. Ltd.
15. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill.
16. G A V Pai, "Data Structures and Algorithms", TMH.
17. G.S.Baluja, "Data Structures through C", Dhanpat Rai & Co.
18. Yashavant Kanetkar, "Data Structure Through C", BPB Publication.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT203PPC02	0	0	4	4 HOURS	30	20	2

DIGITAL ELECTRONICS LAB

Course Objectives

The objectives are to study

1. To provide students basic experimental experiences in constructing digital circuits, measuring the experimental data and analysis of the results.

2. To develop skills to design various combinational and sequential circuits using electronics devices.

Course Outcomes (COs)

After studying this course the students would gain enough knowledge.

1. To acquire knowledge about electronic components and hardware devices required for designing digital electronics circuits.

2. Foster ability to identify, analyze and design combinational circuits.

3. Foster ability to design various synchronous and asynchronous sequential circuits.

4. To acquire knowledge about internal circuitry and logic behind any digital system.

5. To develop skill to build, and troubleshoot digital circuits.

List of Experiments

1. To implement Logic gates using ICs (7400, 7402, 7404, 7408, 7410, 7411, 7420, 7427, 7432, 7486).

2. Implementation of Combinational Circuits.

3. To verify NAND and NOR gates are universal gates.

4. Implementation of Combinational Logic Design using 74** ICs.

5. Simplification of Boolean expression using Karnaugh Map Method.

6. To implement Adder and Subtractor circuits:- (Half and Full using simple gates and universal gates).

7. To verify the truth table of Binary (2 bit) to decimal decoder and octal to decimal decoder.

8. Functional table verification of Latches (i) SR-Latch with NOR Gates (ii) SR-Latch with NAND Gates.

9. Functional table verification of different counters.

10. Functional table verification of shift registers.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
1T2403PPC03			4	3 HOURS	30	20	2

Object Oriented Programming with C++ Lab

Course Objectives:

1. To understand and Practice Programming Construct: Variable, Operators, Control Structures, Loop, Functions, learn the concept of class and object and develop classes for simple applications with C++.
2. To learn how to implement Constructors, copy constructors and destructor functions.
3. To learn how to overload functions and operators in C++.
4. To learn how to design C++ classes for code reuse and perform inheritance.
5. To learn working with files and handle exceptions in program.

List of Experiments:-

1. Write a program to display message using cout statement.
2. Write a program to calculate average of five numbers given by user.
3. Write a program to calculate compound interest given P, R and T.
4. Write a program to calculate factorial of a given number.
5. Write a program to generate n numbers of fibonacii series. Value of n should be provided by user.
6. Write a function to calculate the power of a number raised to another number using function. Write appropriate main() function to read and display the result.
7. Write a function factorial to calculate the factorial of a number, write appropriate main function also.
8. Write a function swap to swap the value of two integer variables. Write appropriate main function for the program.
9. Write a function to perform sorting using bubble sort algorithm. Use arrays to store the list of numbers. Also write main() function to read contents and display output.
10. Write a program to perform overloading of area function.
11. Write a program with overloaded volume function. Use volume function to calculate the volume of a cube, cone, sphere etc.
12. Write a program to calculate simple interest. Use default argument for rate. Write main function to exhibit the use of default argument.
13. Write a program to show the use of return by reference.
14. Write a program with at least one function made as inline.
15. Create a structure data type with data items roll number, name, and total marks. Write main function to read data for two students and also display the stored data.
16. Create a class named 'Student' with a string variable 'name' and an integer variable 'roll no'. Assign the value of roll no as '2' and that of name as "John" by creating an object of the class Student.
17. Write a program to print the area of a rectangle by creating a class named 'Area' having two functions. First function named as 'readData' takes the length and breadth of the rectangle as

parameters and the second function named as 'calculateArea' returns the area of the rectangle. Length and breadth of the rectangle are entered through keyboard.

18. Write a program that would print the information (name, year of joining, salary, address) of three employees by creating a class named 'Employee'. The output should be as follows:

Name	Year of joining	Address
Ramesh	1994	64-C New Delhi
Sam	2000	68-D Bilaspur
John	1999	26-B-Banglore

19. Define a class to represent a bank account. Include the following members:

Data members:
1. Name of the depositor.
2. Account number.
3. Type of account.
4. Balance amount in the account.

Member functions:
1. To assign initial values.
2. To deposit an amount.
3. To withdraw an amount after checking the balance.
4. To display the name and balance.
   Write a main program to test the program.

20. Define a class to represent a bank account (FOR 100 CUSTOMERS). Include the following members:

Data members:
1. Name of the depositor.
2. Account number.
3. Type of account.
4. Balance amount in the account.
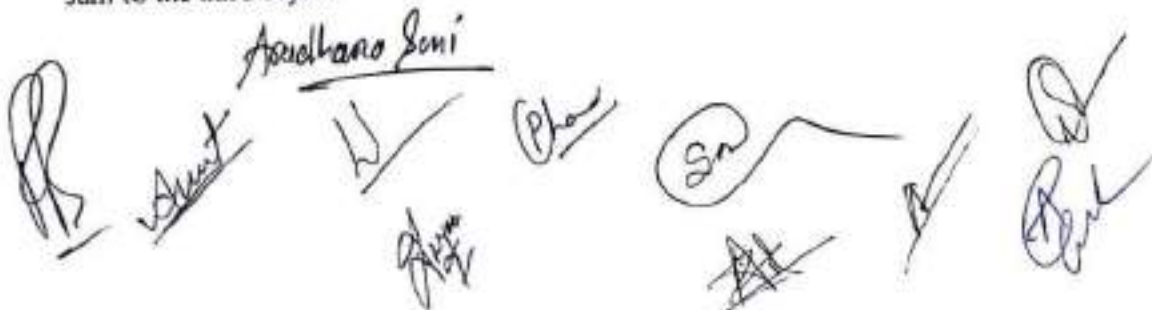
Member functions:
1. To assign initial values.
2. To deposit an amount.
3. To withdraw an amount after checking the balance.
4. To display the name and balance.
   Write a main program to test the program.

21. Create two classes DM and DB which store the value of distances. DM stores distances in meters and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use friend function to carry out the addition operation. The object that stores result may be a DM object or DB object depending on the units in which result is required.
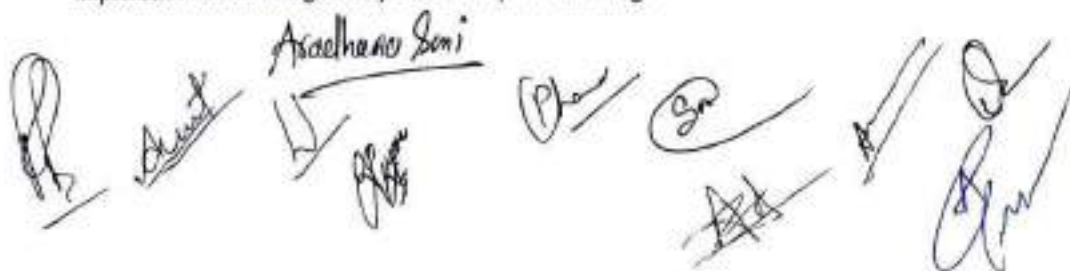
22. Create a class time to store time in hours and minutes. Write a program that can read values for the class objects and add one object with another object storing the result in third object. Use object as arguments to sum() function and object return type from sum() function to assign the sum to the third object.

23. Write a program to demonstrate the use of Static Keyword. Write a program to print the names of students by creating a Student class. If no name is passed while creating an object of the Student class, then the name should be "Unknown", otherwise the name should be equal to the String value passed while creating the object of the Student class. Use "new" operator to create an instance of "name" member of class.

24. Write a program to add two complex number using a friend function. Use appropriate constructor function to initialize the object.

25. Write a program to initialize an object with another using copy constructor.

26. Write a program to show the highest scorer in a test out of three students who appeared in a exam. Use this pointer to refer to objects.

27. Write a program to show the highest scorer in a test out of three students who appeared in a exam. Use this pointer to refer to objects. (USER INPUT)

28. Write a program to illustrate the creation and destruction of objects.

29. Write a program to illustrate pointer to member and pointer to object concepts of OOP.

30. Create two objects of a class with two integer type members. Compare the two operators have same member values. Using overloaded = operator for comparison.

31. Create a class FLOAT that contains one float data member. Overload all the four arithmetic operators so that they operate on the objects of FLOAT.

32. Write a program to overload << and >> operators to display time object.

33. Write a program to overload <=, >= and == operator to compare time objects.

34. Write a program to perform overloading of function call operator.

35. Write a program to perform overloading of subscripting operator.

36. Write a Program to Concatenate two Strings Using Operator Overloading(+).

37. Write a program to convert time type object to an Integer value and integer type value to object of time type. Use appropriate data type conversion functions to perform the required conversion.

38. Write a program for an inventory of product in store. Use appropriate data type conversion functions to perform the required conversion.

39. Define a class Student with data members as rollno and name. Derive a class Fees from student that has a data member fees and functions to submit fees and generate receipt.. Derive another class Result from Student and display the marks and grade obtained by the student.

Course Outcomes:-

1. Understand the C++ language features. Use the control structure and data types in C++. Write simple programs using classes and objects.

2. Understand the concepts of arrays, pointers, references and use of dynamic allocation operators. Write simple programs to implement Constructor & destructor concepts.

3. Understand the concept of Operator overloading and type conversion. Write simple programs using overloaded operators.

4. Understand the concepts of inheritance and virtual functions. Write simple programs to implement inheritance and virtual functions.

5. Understand file handling concepts, generic class and I/O exception handling. Write small programs to implement file handling concepts and exception handling.

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Syllabus

Semester - IV

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
SECOND YEAR, INFORMATION TECHNOLOGY
SEMESTER IV
EFFECTIVE FROM SESSION 2021-22

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT204TPC01	DISCRETE MATHEMATICS	3	1	0	30	70	100	4
2	IT204TPC02	COMPUTER ORGANIZATION & ARCHITECTURE	3	0	0	30	70	100	3
3	IT204TPC03	OPERATING SYSTEMS	3	0	0	30	70	100	3
4	IT204TPC04	DESIGN & ANALYSIS OF ALGORITHMS	3	0	0	30	70	100	3
5	IT204THS02	MANAGEMENT 1 – MANAGEMENT PROCESS AND ORGANIZATIONAL BEHAVIOUR	3	0	0	30	70	100	3
PRACTICAL									
1	IT204PPC01	COMPUTER ORGANIZATION & ARCHITECTURE LAB	0	0	4	30	20	50	2
2	IT204PPC02	OPERATING SYSTEMS LAB	0	0	4	30	20	50	2
3	IT204PPC03	IT WORKSHOP	1	0	2	30	20	50	2
TOTAL CREDITS									22

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

SUB CODE	L	T	p	DURATION	IA	ESE	CREDITS
IT204TPC01	3	1	0	4 HOURS	30	70	4

Course Objective

1. To introduce a number of discrete mathematical structures found to be serving as tools in the development of theoretical computer science.
2. Course focuses on how discrete structures actually helped computer engineers to solve problems occurred in the development of programming languages.
3. Course highlights the importance of discrete structures towards simulation of a problem in computer science engineering.

Discrete Mathematics

Unit 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 Set s, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Unit 2:

Basic counting technique s-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.

Unit 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.

Unit 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

Unit 5:

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path , Cycle, Sub Graph, **Isomorphism, Euterian** and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs , **Four colour conjecture, trees and rooted trees, binary** tree s.

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 Mahapatra,** Elements of Discrete Mathematics A Computer Oriented Approach , 3rd Edition by, Tata McGraw - Hill.

Reference books:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It 's Application to Computer - science - TMG Edition, TataMegraw-Hill.

2. Norman L. Biggs, Discrete 'Mathematics, 2nd Edition, Oxford University Press, Schaum' s Outlines Series, Seymour Lipschutz, Marc Lipson.

COURSE OUTCOME:

After completion of this course students will be

1. Able to apply mathematical logic and Boolean algebra in switching circuits & logic circuits.
2. Familiar with set theory, relation and functions.
3. Familiar with algebraic structures, graph theory and combinatorics.
4. Able to solve problems in various fields in computer science, specially networking.

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SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204TPC02	3	0	0	3 hours	30	70	3

COMPUTER ORGANIZATION & ARCHITECTURE

Course Objectives:

CO1: Conceptualize the basics of organizational and architectural.

CO2: Learn about various basic arithmetic operation

CO3: Learn about various control unit design and Input-output subsystems

CO4: Understand the basics pipeline.

CO5: Understand the basics Memory organization and their basic working.

UNIT 1

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs.

UNIT 2

Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

UNIT 3

Introduction to x86 architecture. CPU control unit design: hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU. Memory system design: semiconductor memory technologies, memory organization. Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB

UNIT 4

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.

UNIT 5

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

Suggested books:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.
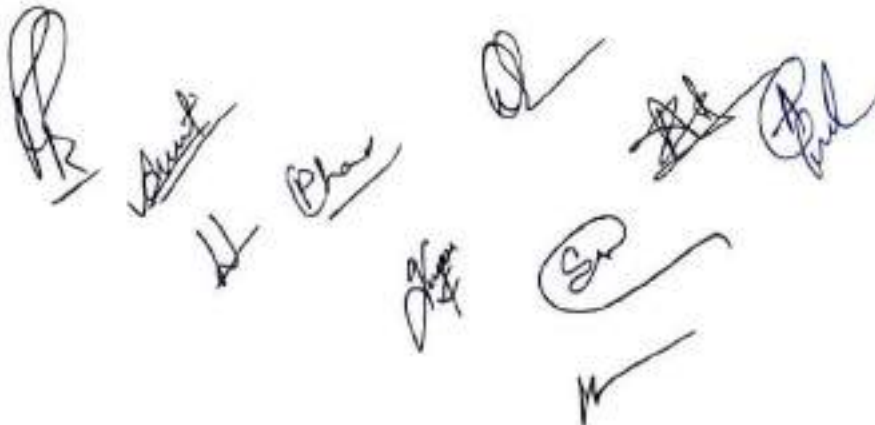
Suggested reference books:

1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

Course Outcomes:

After the course the students are expected to be able to

1: Demonstrate computer organization and architecture concepts of a computer system

2: Describe the Computer arithmetic operation algorithm and hardware

3: Understand the basics of hardwired and micro-programmed control of the CPU, Memory, I/O system

4: Describe fundamentals concepts of pipeline and issues

5: Describe the memory hierarchy and related function,

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204TPC03	3	0	4	3 hours	30	70	3

OPERATING SYSTEMS

Objectives of the course

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication
3. To learn the mechanisms involved in memory management in contemporary OS
4. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
5. To know the components and management aspects of concurrency management

UNIT I - INTRODUCTION TO OPERATING SYSTEM:

Objective and function of operating system. The evaluation of the operating system, system components operating system services, system structure, batch interactive, time sharing and real time operating system, Protection. File system: File concepts, file organization and access mechanism.

UNIT II - 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 .

UNIT III - 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.

UNIT IV - DEAD LOCKS:

System models, deadlock characterization, prevention, avoidance and detection recovery from deadlock, combined approach.

UNIT V - 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 .

Aradhana Smi

Course Outcomes

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, and Response Time.
3. Specification of memory organization develops the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

Reference Books

Milenkovic M. , "Operating System concepts", MGH
Tanenbaubm A. S. "Operating System design and implementation" , PHI
Silberschartz A.and Patterson J.I. , " Operating system concepts", Wisley.
Stilling William " Operating System ", Maxwell McMillan International Edition 1 992.
Dectel H.N. , "An introduction to operating system ", Addision Wisley.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204TPC04	3	0	0	3 hours	30	70	3

DESIGN & ANALYSIS OF ALGORITHMS

Course Objectives

1. To develop proficiency in problem solving and programming.
2. To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.
3. To get a good understanding of applications of Data Structures.
4. To develop a base for advanced study in Computer Science.
5. To teach various advanced design and analysis techniques such as greedy algorithms, dynamic programming & Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

Unit 1:

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

Unit 2:

Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch-and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

Unit 3:

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

Unit 4:

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

Unit 5:

Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE

Suggested books:

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L. Rivest and Clifford Stein, MIT Press/McGraw-Hill.

2. Fundamentals of Algorithms – E. Horowitz et al.

Suggested reference books

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

Course Outcomes

1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
2. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming.
5. To understand an analyses approximation algorithms, Randomized algorithms, NP and P SPACE

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204THS02	3	0	0	3 hours	30	70	3

MANAGEMENT PROCESS AND ORGANIZATIONAL BEHAVIOUR

Course Objectives:

1. To help the students to develop cognizance of the importance of Management processes.
2. To enable students to describe how people behave under different conditions and understand why people behave as they do.
3. To provide the students to analyse specific strategic human resources demands for future action.
4. To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control management processes, human behaviour and improve results.

Course Outcomes (Cos):

On completion of this course, the students will be able to

1. To understand the concept of Management.
2. Demonstrate the applicability of the concept of Management processes to understand the functioning of the organization.
3. Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.
4. Analyze the complexities associated with management of the group behavior in the organization.
5. Demonstrate the applicability to manage the organization.

UNIT -I

School of Management Thought: Evolution of Management thought, Systems and Contingency approach of management, Decision Theory School.

UNIT -II

Managerial processes, functions, skills and roles in an organization. Nature, process and technique of planning, Organizing, Staffing, Directing, Coordinating, Control.

UNIT -III

Organizational Behavior: Concept, Significance, Understanding and Managing individual behavior – Personality, Perceptions, Values, Attitudes, Learning, Work-motivation, Individual Decision Making and Problem solving.

UNIT -IV

Understanding and Managing Group Processes: Interpersonal and Group dynamics. Applications of emotional intelligence in organizations. Group decision making. Leadership and Influence Process : Concept, styles and Theories.

UNIT – V

Understanding and Managing Organizational Systems, Organizational Conflict — sources, pattern levels and types of conflict. Organizational design and structure. Work stress.

Suggested Readings

1. Koontz, Harold, Cyril O'Donnell, and Heinz, Whelrich. Essentials of Management. New Delhi: Tata Mc Graw Hill.

2. Robbins, S.P. Organizational Behaviour. New Delhi: PHI.

3. Luthans, F. Organisational Behaviour. NewYork: Mc Graw Hill.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204PPC01	0	0	4	4 HOURS	30	20	2

COMPUTER ORGANIZATION & ARCHITECTURE LAB

Course Objectives:

The Objective is to expose the students to the various key aspects of Computer Organization & Architecture by enabling them to perform the experiments with support of a design and simulation in Logisim, GNUsim8085 or other simulator.

List of Practical's

1. Write the working of 8085 simulators GNUsim8085 and basic architecture of 8085 along with small introduction.
2. Study the complete instruction set of 8085 and write the instructions in the instruction set of 8085 along with examples.
3. Write an assembly language code in GNUsim8085 to implement data transfer instruction.
4. Write an assembly language code in GNUsim8085 to store numbers in reverse order in memory location.
5. Write an assembly language code in GNUsim8085 to implement arithmetic instruction.
6. Write an assembly language code in GNUsim8085 to add two numbers using lxi instruction.
7. Write an assembly language code in GNUsim8085 to add two 8 bit numbers stored in memory and also storing the carry.
8. Write an assembly language code in GNUsim8085 to find the factorial of a number.
9. Write an assembly language code in GNUsim8085 to implement logical instructions.
10. Write an assembly language code in GNUsim8085 to implement stack and branch instructions.
11. Design Ripple Carry Adder using simulator
12. Design Carry-Look-Ahead Adder using simulator
13. Design Registers and Counters using simulator
14. Design Combinational Multipliers using simulator
15. Booth's Multiplier using simulator
16. Arithmetic Logic Unit using simulator
17. Memory Design using simulator
18. Write a C program to implement Booth's algorithm for multiplication.
19. To write a C program for multiplication of two binary numbers
20. To write C program for sum of two binary number
21. Write a program to implement Division Algorithm.
22. To Study the Logisim Tool
23. Design of Half-adder circuit

24. Design of Full-adder circuit
25. Design of Ripple -adder circuit

Course Outcomes:

After the course the students are expected to be able to describe in detail the internal and external working of computer.

References:

1. https://cse.iitkgp.ac.in/~chitta/coldvl/comp.html

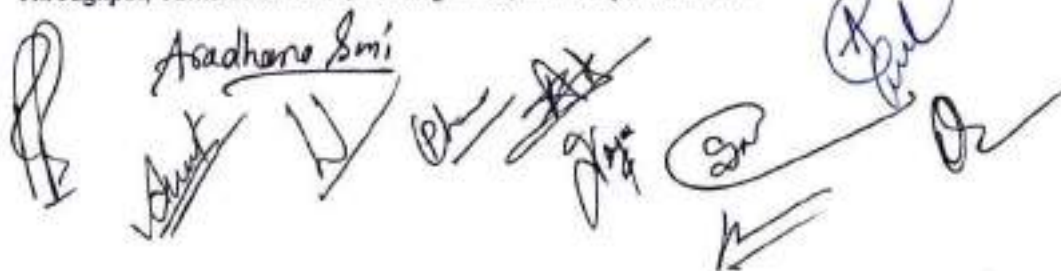| SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT204PPC02	0	0	4	4 HOURS	30	20	2

OPERATING SYSTEMS LAB

Course Objectives

1. To learn the fundamentals of Operating Systems.

2. To learn the mechanisms of OS to handle processes and threads and their communication

3. To learn the mechanisms involved in memory management in contemporary OS

4. To gain knowledge on distributed operating system concepts that includes architecture,

Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols

5. To know the components and management aspects of concurrency management

List of Experiments

1. Simulate the following CPU scheduling algorithms.
   a)FCFS   b) SJF c) Round Robin   d) Priority.

2. Write a C program to simulate producer-consumer problem using Semaphores

3. Write a C program to simulate the concept of Dining-philosophers problem.

4. Write a C program to simulate the following contiguous memory allocation Techniques
   Worst fit   b) Best fit   c) First fit.

5. Simulate all page replacement algorithms a)
   FIFO b) LRU   c) OPTIMAL

6. Simulate all File Organization Techniques
   a)   Single level directory b) Two leveldirectory

7: Simulate Bankers Algorithm for Dead Lock Avoidance and dead lock prevention.

8. Write a program to simulate disk scheduling algorithms.
   a) FCFS   b) SCAN   c) C-SCAN

Course Outcomes

1. Create processes and threads.

2. Develop algorithms for process scheduling for a given specification of CPU utilization,

Throughput, Turnaround Time, Waiting Time, and Response Time.

3. Specification of memory organization develops the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.

4. Design and implement file management system.

5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

Aradhana Soni

Syllabus

Semester - V

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER V
EFFECTIVE FROM SESSION 2020-21

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT05TES01	SIGNALS & SYSTEMS	3	0	0	30	70	100	3
2	IT05TPC01	DATABASE MANAGEMENT SYSTEMS	3	0	0	30	70	100	3
3	IT05TPC02	FORMAL LANGUAGE & AUTOMATA THEORY	3	0	0	30	70	100	3
4	IT05TPC03	OBJECT ORIENTED PROGRAMMING	3	1	0	30	70	100	4
5	IT05TPE1X	ELECTIVE–I	3	0	0	30	70	100	3
PRACTICAL									
1	IT05PPC01	DATABASE MANAGEMENT SYSTEMS LAB	0	0	4	30	20	50	2
2	IT05PPC02	OBJECT ORIENTED PROGRAMMING LAB	0	0	4	30	20	50	2
3	IT05PMC01	CONSTITUTION OF INDIA/ ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	-	-	2	-	-	-	0
TOTAL CREDITS									20

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION; L-LECTURE, T-TUTORIAL, P-PRACTICAL.

LIST OF ELECTIVE-I

1	IT05TPE11	SOFTWARE ENGINEERING
2	IT05TPE12	REAL TIME SYSTEM
3.	IT05TPE13	CYBER LAW & ETHICS
4.	IT05TPE14	EMBEDDED SYSTEMS

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TES01	3	0	0	3 HOURS	30	70	3

SIGNALS & SYSTEM

UNIT – I Signals & Systems: Classification of Signals, Energy and Power Signals, Classification of systems, Properties of systems – Linearity: additivity and homogeneity, Shift-invariance, Causality, Stability. Time domain Analysis of Discrete time and Continuous time System – Impulse Response, Step Response and Convolution, Properties of Convolution, system representation of differential and difference equation.

UNIT – II Analysis of Continuous & Discrete time Signals: Fourier series Representation, Continuous Time Fourier Transform (CTFT), Magnitude & Phase response, Properties of CTFT, System Analysis with Fourier Transform.
   Discrete-Time Fourier Transform (DTFT), Properties of DTFT, Frequency response of discrete time LTI systems, Discrete Fourier Transform (DFT)

UNIT – III Review of Laplace transform: Laplace transforms, Laplace transforms of common signals, Properties of Laplace transforms, Inverse Laplace transforms, Region of Convergence, Poles and Zeros of the system, Laplace domain analysis of continuous time systems, solution to differential equations & system behavior.

UNIT – IV Z-Transform: Z-transforms of common sequences, Properties of Z-transforms, Region of Convergence, Inverse Z-transforms, Analysis of discrete time systems using Z-transforms.

UNIT – V State space Analysis: State Space analysis and multi-input multi-output representation, State Transition Matrix (STM) and its role. The Sampling theorem and its implications- Spectra of sampled signals, Reconstruction: Ideal interpolator, zero order hold, first order hold, Aliasing & its effect.

Text Books
1. Signal & System, A V Oppenheim, PHI
2. Signal & System, P Ramesh Babu, Scitech Publication
3. Signal & System, F Hussain, Umesh Publication
4. Discrete Time Signal Processing, A V Oppenheim, Pearson Education

Reference Books
5. Signals and Systems, by Simon Haykin and Barry Van Veen, Wiley, 1999.
6. Schaum's Outline of Signals and Systems – H Hsu, TMH.
7. Signal & System, Samarjit Ghosh, TMH.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TPC01	3	0	0	3 HOURS	30	70	3

Database Management Systems

Unit 1: Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit 2: Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Unit 3: Storage strategies: Indices, B-trees, hashing. Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

Unit 4: Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

Unit 5: Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

Text books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

Reference books

1 "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

2 "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education

3 "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TPC02	3	0	0	3 HOURS	30	70	3

Formal Language & Automata Theory

Unit-I Automata: Basic machine, FSM , Transition graph, Transition matrix, Deterministic and nondeterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines. minimization of finite automata, Two-way finite automata. Regular Sets and Regular Grammars: Alphabet, words, Operations, Regular sets, Finite automata and regular expression, MyhillNerode theorem Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

Unit-II Context –Free Grammars: Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

Unit-III Pushdown Automata: Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA. Context Free Languages: The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.

Unit-IV Turing Machines: Introduction, TM model, representation and languages acceptability of TM Design of TM,Universal TM & Other modification, Church's hypothesis, composite & iterated TM. Turing machine as enumerators.Properties of recursive & recursively enumerable languages,Universal Turing machine

Unit V Tractable and Untractable Problems: P, NP, NP complete and NP hard problems, examples of these problems like satisfiability problems, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc.

Text books
1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
- 2. Peter Linz, An Introduction to Formal Languages and Automata, Viva Publisher.

Reference books:
1. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
2. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
3. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
4. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TPC03	3	1	0	3 HOURS	30	70	4

OBJECT ORIENTED PROGRAMMING

UNIT I

Overview of C++ : Object oriented programming, Concepts, Advantages, Usage. C++ Environment: Program development environment, the language and the C++ language standards. Introduction to various C++ compilers, C++ standard libraries, Prototype of main() function, Data types. C++ as a superset of C, New style comments, main function in C++, meaning of empty argument list, function prototyping, default arguments and argument matching.

User defined data types: enumerated types, use of tag names, anonymous unions, scope of tag names Classes & Objects : Classes, Structure & Classes, Inline Function, Scope Resolution operator, Static Class Members: Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment. Friend Function, Friend Classes

UNIT II

Array, Pointers References & The Dynamic Allocation Operators: Array of Objects, Pointers to Object, Type Checking C++ Pointers, The This Pointer, Pointer to Derived Types, Pointer to Class Members, References: Reference Parameter, call by reference and return by reference Passing References to Objects, Returning Reference, Independent Reference. C++'S Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects.

Constructor &Destructor :Introduction, Constructor, access specifiers for constructors, and instantiation, Parameterized Constructor, Multiple Constructor in A Class, Constructor with Default Argument, Copy Constructor, Destructor.

UNIT III

Overloading as polymorphism: Function & Operator Overloading : Function Overloading, Overloading Constructor Function Finding the Address of an Overloaded Function, Operator Overloading: Creating A Member Operator Function, Creating Prefix & Postfix Forms of the Increment & Decrement Operation, Overloading The Shorthand Operation (i.e., +=, -= etc), Operator Overloading Restrictions, Operator Overloading Using Friend Function, Overloading Some Special Operators like [ ], ( ), -, Comma Operator, Overloading << etc.

UNIT IV

Inheritance : Base Class Access Control, Inheritance & Protected Members, Protected Base Class Inheritance, Inheriting Multiple Base Classes, Constructors, Destructors & Inheritance, When Constructor & Destructor Function are Executed, Passing Parameters to Base Class Constructors, Granting Access, Virtual Base Classes .

Virtual Functions & Polymorphism : Virtual Function, Pure Virtual Functions, Early Vs. Late Binding.

UNIT V

Working with files: File & stream, Opening and closing a file, read ( ) and write ( ) functions, detecting end of file.

Templates and Exception Handling: Exception handling in C++, try, throw, catch sequence, multiple catch blocks, uncaught exceptions, catch-all exception handler

Text Books :

Object Oriented Programming With C++ by M. P. Bhave, S. A. Patekar, Pearson Education

Object Oriented Programming With C++ by E. Balaguruswamy.

Object Oriented Programming in turbo C++ by Robert Lafore.

Reference Books :

Programming with C++ by D. Ravichandan.

Programming with C++(SOS) by Hubbard.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TPE11	3	0	0	3 HOURS	30	70	3

SOFTWARE ENGINEERING

UNIT I Software Engineering – What is software, Characteristics of software, Application of software, Software Development Life Cycle, Software Process Models - Linear Sequential model, Prototype model, RAD model, Incremental model, Component Based Development Model, Fourth Generation Techniques.

UNIT II . Software Requirement Specification-Problem Analysis, Requirement Specification, Validation, metrics, monitoring and control.

UNIT III System Design - Problem portioning, abstraction, top-down and bottom-up design, Structured approach, Coupling and Cohesion,Functional versus Object oriented approach, design specification and verification, metrics.

UNIT IV Coding: Top–down and bottom-up structured programming, information hiding, programming style, internal documentation,verification. Metrics, Monitoring and Control

UNIT V Software testing – Software Testing fundamentals, Black Box Testing, White box testing, Basics path testing, A strategic Issues, Types of Testing-Unit testing, Integration testing, validation testing, System Testingsoftware metrics, software evaluation, software maintenance & reliability.

Text Books:

1. Software Engg. Pressmen
2. Software Engg. Pankaj Jalote

Reference Books:

3. Software Engg. Shaum's Outline Series
4. Fundamentals of Software Engineering, Rajib Mal.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TPE12	3	0	0	3 HOURS	30	70	3

REAL TIME SYSTEM

UNIT I - INTRODUCTION TO TASK SCHEDULING Introduction - Issues in Real Time Computing, Structure of a Real Time System, Task classes, Performance Measures for Real time Systems, Task Assignment and Scheduling – Classical uni processor scheduling algorithms, RM algorithm with different cases-Priority ceiling precedence constraints- using of primary and alternative tasks.

UNIT II - UNI AND MULTI PROCESSOR SCHEDULING
Uniprocessor scheduling of IRIS tasks, Task assignment, Utilization balancing – Next fit- Bin packing- Myopic off-line - Focused addressing and bidding- Buddy strategy- Fault Tolerant Scheduling.-Aperiodic scheduling - Spring algorithm, Horn algorithm- Bratley. - Sporadic scheduling.

UNIT III - REAL TIME COMMUNICATION Introduction – VTCSMA – PB CSMA-Deterministic collision resolution protocol- DCR for multi packet messages- dynamic planning based- Communication with periodic and aperiodic messages.

UNIT IV - REAL TIME DATABASES

Basic Definition, Real time Vs General purpose databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency control issues, Disk Scheduling Algorithms, Two-phase Approach to improve Predictability, Maintaining Serialization Consistency, Databases for Hard Real Time System.

UNIT V - REAL-TIME MODELING AND CASE STUDIES
Petrinets and applications in real-time modeling, Air traffic controller system – Distributed air defense system.

Text Books
1. C.M. Krishna, Kang G. Shin, "*Real Time Systems*", Tata McGraw - Hil, 2010.
2. Giorgio C. Buttazzo , "*Hard real-time computing systems: predictable scheduling algorithms and applications*" , Springer, 2008.

References Book
3. C. Siva Ram Murthy, G. Manimaran, "*Resource management in real-time systems and networks*", PHI, 2009.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TPE13	3	0	0	3 HOURS	30	70	3

Cyber Law & Ethics

Unit I: Fundamentals of Cyber Space, Understanding Cyber Space, Interface of Technology and Law Defining Cyber Laws

Unit II. Jurisdiction in Cyber Space, Concept of Jurisdiction, Internet Jurisdiction, Indian Context of Jurisdiction

International position of Internet Jurisdiction Cases in Cyber Jurisdiction

Unit III. E-commerce- Legal issues, Legal Issues in Cyber Contracts, Cyber Contract and IT Act 2000, The UNCITRAL Model law on Electronic Commerce

Unit IV Intellectual Property Issues and Cyberspace – The Indian Perspective, Overview of Intellectual Property related Legislation in India. Copyright law & Cyberspace, Trademark law & Cyberspace, Law relating to Semiconductor Layout & Design

Unit- V Cyberspace law and law enforcement, information warfare and the military, and intelligence in the information age. Information warfare policy and ethical Issues.

Text Books:

1. Hon C Graff , Cryptography and E-Commerce, Wiley Computer Publisher, 2001
2. Karnika Seth, Computers, Internet and New Technology Laws, Lexis NexisButterworthsWadhwa Nagpur.

Reference Books:

3. Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
4. Justice Yatindra Singh,Cyber Laws, Universal Law Publishing Co, New Delhi, (2012).

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT05TPE14	3	0	0	3 HOURS	30	70	3

EMBEDDED SYSTEMS

UNIT 1: Introduction of Embedded systems

An Embedded system, processor in system, Hardware units, Software embedded in systems, Exemplary Embedded systems, Embedded Systems-On-Chip(SOC) and VLSI circuit.

UNIT 2: Processor and memory Organization

Structural units in a Processor, Processor selection for an embedded system, memory devices, memory selection for an embedded system, allocation of memory to programme segments and blocks and memory map of a system, direct memory access, Interfacing Processor, memories and I/O devices.

UNIT 3: Devices and Buses for Device Network

I/O devices, Timer and counting devices, Serial communication using 'I²-C', 'CAN' and advanced I/O buses, between the networked multiple devices, Host system or computer parallel communication between the networked I/O multiple devices using the ISA,PCI, PCI-X and advanced buses.

UNIT 4: Devices Derivers and Interrupts Service Mechanism

Device drivers, parallel port device drivers in a system, serial port device drivers in a system, Device drivers for Internal programmable timing devices, Interrupt Servicing (Handling) Mechanism, context and periods for context-switching, deadline and interrupt latency.

UNIT 5: Hardware-Software Co-design in an Embedded System

Embedded System project management, Embedded System design and co-design issues in system development process, design cycle in the development phase for an embedded system, uses of target systems or its emulator and in-circuit emulator (ICE), use of software tools for development for an embedded system, use of scopes and logic analysers for system hardware tests, Issues in embedded system design.

Text Book
1. Embedded Systems (Architecture, programming and design) by Raj Kamal ,Tata McGraw-Hill Publishing Company Limited.

Reference Book
2. Embedded systems design by RajeshwarSingh ,Dhanpat Rai publications.

Syllabus

Semester - VI

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT06TPC01	COMPILER DESIGN	3	0	0	30	70	100	3
2	IT06TPC02	COMPUTER NETWORKS	3	0	0	30	70	100	3
3	IT06TPE2X	ELECTIVE – II	3	0	0	30	70	100	3
4	IT06TPE3X	ELECTIVE – III	3	0	0	30	70	100	3
5	IT06TOE11	OPEN ELECTIVE - I	3	0	0	30	70	100	3
PRACTICAL									
1	IT06PPC01	COMPUTER NETWORKS	0	0	4	30	20	50	2
2		ELECTIVE – III LAB	0	0	4	30	20	50	2
3	IT06PPR11	PROJECT - I	0	0	6	30	20	50	3
TOTAL CREDITS									22

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

LIST OF ELECTIVE – II

1.	IT06TPE21	MICROPROCESSOR & INTERFACING
2.	IT06TPE22	WEB TECHNOLOGY & E-COMMERCE
3.	IT06TPE23	QUEUING THEORY & MODELING
4.	IT06TPE24	IMAGE PROCESSING

LIST OF ELECTIVE – II (LAB)

1.	IT06PPE21	MICROPROCESSOR & INTERFACING
2.	IT06PPE22	WEB TECHNOLOGY & E-COMMERCE
3.	IT06PPE23	QUEUING THEORY & MODELING
4.	IT06PPE24	IMAGE PROCESSING

LIST OF ELECTIVE-III

1.	IT06TPE31	GRID & CLOUD COMPUTING
2.	IT06TPE32	MULTIMEDIA SYSTEM DESIGN
3.	IT06TPE33	SPEECH & NATURAL LANGUAGE PROCESSING
4.	IT06TPE34	GRAPH THEORY

LIST OF OPEN ELECTIVE-I

1.	IT06TOE11	COMPUTER GRAPHICS
2.	IT06TOE12	WIRELESS & MOBILE COMMUNICATION
3.	IT06TOE13	DISTRIBUTED SYSTEM
4.	IT06TOE14	BIOMETRICS

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPC01	3	0	0	3 HOURS	30	70	3

Complier Design

UNIT 1: Introduction: Phases of compilation and overview. Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, from regular expressions to finite automata, scanner generator (lex, flex).

UNIT 2: Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) gram-mars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison)Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.

UNIT 3: Symbol Table: Its structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and scope.

UNIT 4: Intermediate Code Generation: Translation of different language features, different types of intermediate forms. Code Improvement (optimization): Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc.

UNIT 5: Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation Advanced topics: Type systems, data abstraction, compilation of Object Oriented features and non-imperative programming languages.

Text Books:

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,

Reference Books:

3. Tremblay J.P. and Sorenson, P.G. the theory and practice of compiler writing, Mc Graw Hil,

4. Waite W.N. and Goos G., Compiler construction' springer verlag

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPC02	3	0	4	3 HOURS	30	70	3

Computer Networks

UNIT I - Introduction: OSI and TCP/IP Reference models, Function of layers, Network Topologies, Categories of Network - LAN, WAN, MAN, Line Configuration, Transmission Modes, Networking Devices.

UNIT II - Data link layer: Design issues, framing, error detection and correction, CRC, Hamming Code Method, Elementary Protocol- stop and wait, Sliding Window, HDLC, Ethernet, CSMA/CD.

UNIT III - Network Layer: Design Issues, Forwarding and Routing, Virtual Circuit and Datagram Networks, shortest path routing – Dijkstra's algorithms, Link State Routing, Distance Vector Routing, Internet Protocol (IP), Hierarchical Routing – RIP – OSPF – BGP.

UNIT IV - Transport Layer: Transport Layer Services, Transmission Control Protocol, TCP header, 3 way Handshake, UDP, UDP header, Difference between TCP and UDP, Reliable Data Transfer – Go Back N and Selective Repeat.

UNIT V - Application Layer: Principles of Network Applications, Encryption, Compression, Cryptography: Substitution and Transposition Ciphers, Data functions: translation, Encryption standards (DES), RSA, Email, World Wide Web, file transfer protocol, VoIP, TFTP.

TEXT BOOKS

1. Data Communications and Networking – Behrouz A. Forouzan. TMH.
2. Computer Networks — Andrew S Tanenbaum, Pearson Education/PHI.
3. Data and Computer Communication by William Stalling (Pearson Education).

REFERENCE BOOKS

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.
3. Computer Networking by Ed Tittel (Schaum's series) (TMH).
4. Comer, "Computer Networks and Internets with Internet Applications", Pearson Education.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TOE11	3	0	0	3 HOURS	30	70	3

COMPUTER GRAPHICS

UNIT-I OVERVIEW OF GRAPHICS SYSTEM:

I/O devices, Raster scan & Random scan system, DDA &Bresenhams Line drawing Algorithm,Mid-Point &Bresenhamscircle drawing Algorithm,Midpoint ellipse generating algorithm, Clipping: Sutherland Cohen LineClipping, Polygon clipping: Hodgeman-Sutherland&Weiler-Atherton polygon clipping.2-D & 3-D Transformation.

UNIT-II CURVES &SURFACES:

Conics-Parametric forms for circle, ellipse, parabola, Bezier Curves-Need for cubic parametric curves c0, c1, c2 continuity, Generation though Bernstein polynomials, Condition for smooth joining of 2 segments, Convex Hull property, B-Spline Curves: Knot vectors-uniform and open uniform curves, Uniform, Periodic B-splines, Open B-splines, Uniform B-splines, Non-uniformB-splines, Rational B-splines, Beta splines.

UNIT-III PROJECTIONS & HIDDEN SURFACE REMOVAL :

Parallel projection on xy plane (including oblique view), Perspective projection-1, 2 and 3 Vanishing points, Reconstruction of 3-D images. Hidden Surface Removal: Back face removal, Floating Horizon method for curved objects, Z-Buffer or Depth Buffer Algorithm, Painters algorithm (Depth sorting method), Binary space partitioning trees, Scan-line algorithm, Warnock's algorithm.

UNIT-IV SHADING & COLOR ISSUES :

Filled Area Primitives,Illumination model for diffused & specular reflection, Computing reflection vector.Gouraud and Phog Shading, Texture mapping, Bump mapping, Handling shadows, Radiosity: Lambert's Law, Basic element, Modeling transparency, Visualization of data sets, volume rendering, Color issues: Additive, Subtractive primaries,Filled Area Primitives.

UNIT-V FRACTALS &ANIMATION:

Fractals: self-similar fractals-fractal dimension, Generation of Terrain-random midpoint displacement, Self-squaring fractals. SolidModeling: Generation through sweep techniques, Constructive sold geometry, B representations, Octrees, Ray Tracing & their Theory, Animation: In-between using rotation and translation, Procedural animation, Morphing, Motion Control (Key framing).

Text Books:
1. Computer graphics, Hearn and Baker, PHI
2. Computer Graphics, Foley, PE-LPE,

Reference Books:
1. Procedural Elements of Computer graphics, Rogers, McGraw Hill
2. Computer graphics, Harringtons S., McGraw Hill.
3. Computer Graphics, Schoum Series.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TOE12	3	0	0	3 HOURS	30	70	3

WIRELESS & MOBILE COMMUNICATION

UNIT-I INTRODUCTION TO MOBILE & WIRELESS DEVICES:
Mobile and Wireless Devices, Simplified Reference Model; Wireless Transmission, Frequencies for Radio Transmission, Regulations, Technology ; Cellular Systems, Specialized MAC; SDMA; FDMA; TDMA; CDMA.

UNIT-II TELECOMMUNICATION & BROADCAST SYSTEMS GSM:
Satellite Systems, Applications, GEO, LEO, MEO, Routing, Localization, Handover; Broadcast Systems, Cyclic Repetition of Data, Digital Audio Broadcasting.

UNIT-III WIRELESS NETWORKS Wireless LAN:
IEEE 802.11, HIPERLAN, Wireless ATM, Services, Reference Model, Functions, Handover, Location Management, Addressing, QOS.

UNIT-IV MOBILE NETWORK AND TRANSPORT LAYERS:
Mobile Network Layer; Mobile IP, Transport Layer; Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP; Fast Transmit/Fast Recovery, Transmission/Time Out Freezing, Selective Retransmission, Transaction Oriented TCP.
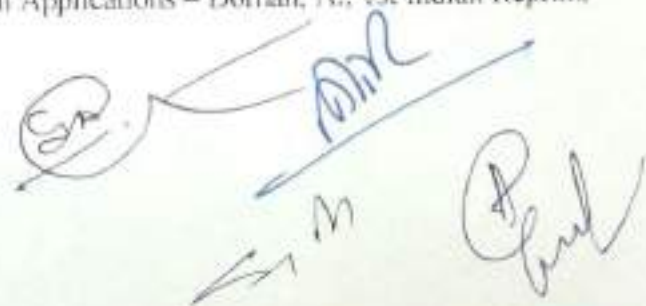
UNIT-V: Mobile Ad Hoc Networks (MANETs)
Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs. Protocols and Tools: Wireless Application Protocol-WAP. Bluetooth and J2ME.

Text Book
1. Mobile Communications – Schiller, Jochen; 2nd Indian Reprint, Pearson Education Asia-Addison Wesley Longman PTE. Ltd.

Reference Books:
1. Mobile Data Wireless LAN Technologies – Dayem, Rifaat A.; Prentice Hall International.
2. The Essential Guide To Wireless Communication Applications – Dornan, A.; 1st Indian Reprint, Pearson Education Asia.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TOE13	3	0	0	3 HOURS	30	70	3

DISTRIBUTED SYSTEM

UNIT -1 INTRODUCTION

Introduction to Distributed System – Goals: - advantages of distributed system over centralized ones,advantages of distributed system over independent PC's, Disadvantages of distributed system.Hardware Concept - Bus based multiprocessors, switched multiprocessors, bus based multi-computers,switched multi-computers. Software Concept – Network operating system and NFS, true DistributedSystem, multi-processor time sharing system. Design Issues – Transparency, Flexibility, Reliability,Performance and Scalability.

UNIT-2 COMMUNICATION IN DISTRIBUTED SYSTEM

Layered protocol, The client server method - Clients and servers, Remote procedure call – Basic RPCfailures, implementation issues, problem areas.Group Communication: - Introduction to Group Communication, design issues, Synchronization and Replication: Clocks, events and process states - Synchronizing physical clocks- Logical time and logical clocks - Distributed mutual exclusion - Elections - Transactions and Concurrency Control, MPI, RMI

UNIT-3 DISTRIBUTED FILE SYSTEMS

Introduction, desirable features of a good distributed file system, File Model, file accessing models, filesharing semantics, file caching schemes, file replication, fault tolerance, atomic transactions, designprincipal, case studies.Resource Management And Process Management :Introduction, Desirable features of a good global scheduling algorithm, Task assignment approach, load balancing approach, process migration, threads. Case studies: HDFS, GFS,

UNIT-4DISTRIBUTED COMPUTING SYSTEMS

Introduction to grid and cluster computing, Beowulf cluster, Globus toolkit, grid Security Infrastructure, OGSA, case studies: crypto currencies and block chain, botnet, IOT, Distributed information systems, distributed pervasive systems, distributed object based system, java beans. Cloud computing, Open Stack

UNIT 5 HIGH PERFORMANCE COMPUTING

Hardware requirements for High performance computing, supercomputing, rack system and design, GPU centric computing, High end CPU and GPU, HPC on commodity hardwares, case studies: Cray Systems

TEXT BOOKS
1. Modern operating system – Andrew S. Tanenbaum.
2. Distributed Operating Systems Concepts and Design – Pradeep K. Sinha.

REFERENCE BOOKS
3. Georg Hager and Gerhard Wellein, Introduction to High Performance Computing for Scientists and Engineers, Chapman & Hall, 2010.
4. IBM Red Book: "Introduction to Grid Computing with Globus", Luis Ferreira et al.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TOE14	3	0	0	3 HOURS	30	70	3

BIOMETRICS

UNIT 1 Introduction and Definitions of biometrics, Traditional authenticated methods and technologies.

UNIT 2 Biometric technologies: Fingerprint, Face, Iris, HandGeometry, Gait Recognition, Ear, Voice, Palm print,

UNIT 3 On-Line Signature Verification, 3D Face Recognition, Dental Identification and DNA.

UNIT 4 The Law and the use of Multibiometrics systems. Statistical measurement of Biometric. Biometrics in Government Sector and Commercial Sector.

UNIT 5 Case Studies of biometric system, Biometric Transaction. Biometric System Vulnerabilities.

Text book
1. Biometrics for network security, Paul Reid, Hand book of Pearson

Reference books
1. D. Maltoni, D. Maio, A. K. Jain, and S. Prabhakar, Handbook of Fingerprint Recognition, Springer Verlag, 2003.

2. A. K. Jain, R. Bolle, S. Pankanti (Eds.), BIOMETRICS: Personal Identification in Networked Society, Kluwer Academic Publishers, 1999.

3. J. Wayman, A.K. Jain, D. Maltoni, and D. Maio (Eds.), Biometric Systems: Technology, Design and Performance Evaluation, Springer, 2004.

4. Anil Jain, Arun A. Ross, Karthik Nanda kumar, Introduction to biometric, Springer, 2011.

5. Biometric Systems: Technology, Design and Performance Evaluation, J. Wayman, A.K. Jain, D. Maltoni, and D. Maio

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE21	3	0	0	3 HOURS	30	70	3

MICROPROCESSOR AND INTERFACE

UNIT 1: Architecture of Microprocessors

Architecture of 8085 Microprocessor.Architecture of 8086 Microprocessor. Signals and pins of 8086 microprocessor

UNIT 2: Assembly Language of 8086

Description of Instructions, Assembly Directives Assembly, Software Programs with Algorithms

UNIT 3: Interfacing with 8086

Interfacing with RAMs, ROMs along with the explanation of timing diagrams.Interfacing with Peripheral ICs like 8255, 8254, 8279, 8259 etc.Architecture of 8087, Interfacing with 8086.

UNIT 4: Architecture of Micro controllers

Architecture of Microcontroller, Family members, Microcontroller Resources, Architecture of 8051 Microcontroller, Internal External memories, Counters &Timers, Synchronous Serial-Cum-Asynchronous Serial Communication USART Interface in Intel 8051, Interrupts.

UNIT 5: Assembly language of 8051

Basic Assembly Language Programming in 8051, 8051 family Microcontrollers Instruction set.

TEXT/REFERENCE BOOKS
1. Advanced Microprocessor and peripherals by K M Bhurchandi and A K Ray, McGraw Hill Education (India).
2. Architecture programming, interfacing and system design by raj kamal ,pearson education.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE22	3	0	0	3 HOURS	30	70	3

WEB TECHNOLOGY & E-COMMERCE

UNIT I
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.

UNIT II
HTML: - Introduction, , content positioning HTML content, Layer object, Handling events using localized scripts, Animating images.HTML List,HTML Table & DHTML. Cascading style sheets.

UNIT III
Active Server Page(ASP) Introduction , Internet Information System , Basic authentication , 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 , ADO record set object.

UNIT IV
XML: Introduction, difference between XML & HTML, building application with XML, XML schemas, DTD & XSLT.

UNIT V
Security of E-Commerce transactions, E-Commerce models- B2B, B2C, review of cryptographic tools,authentication,signatures, observers, anonymity, privacy, tractability, key certification, managementetc.EDI, Payment protocols and standards, smart card, e-card, e-wallet technologies, electronic money and electronic payment systems.

Text Books:
1. Minoli and Minoli, Web technology and Commerce, TMH
2. Web Technology, Achyut Godbole, Atul Kahate, TMH
3. Principles of Web Design, Sklar, Cengage
4. Electronic Commerce, Schneider, cengage Learn
5. The E-Business revolution, Daniel Amor, PHI

Reference Books:
6. E-Government, Satyanarayana, PHI
7. E-Commerce, Greenstein, TMH
8. Koisur David : Electronic Commerce, Microsoft
9. Ravi Kalakota : Frontiers of Electronic commerce

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE23	3	0	0	3 HOURS	30	70	3

QUEUEING THEORY

UNIT 1 RandomeVariables

Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions.

UNIT 2 Two-Dimentional Random Variables
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and & Linear regression – Transformation of random variables.

UNIT 3 Random Processes
Classification – Stationary process – Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations – Limiting distributions.

UNIT 4 Queueing Model
MarKovian queues – Birth and Death processes – Single and multiple server queueing models –Little's formula -Queues with finite waiting rooms – Queues with impatient customers : Balkingand reneging.

UNIT 5 Advanced Queueing Models
Finite source models – M/G/1 queue – Pollaczekkhinchin formula – M/D/1 and $M/E_k/1$ asspecial cases – Series queues – Open Jackson networks.

TEXT BOOKS:

1. Ibe. O.C., "Fundamentals of applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007
2. Gross. D. and Harris. C.M., "Fundamentals of Queueing Theory", WileyStudent edition,2004.

REFERENCE BOOKS:

1. Robertazzi, "Computer Networks and Systems: Queueing Theory and performance evaluation",Springer, 3RdEdition, 2006.
2. Taha. H.A., "Operations Research", Pearson Education, Asia, 8th Edition, 2007.
3. Trivedi.K.S.,"Probability and Statistics with Reliability, Queueing and Computer Science applications", John Wiley and Sons, 2nd Edition, 2002.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE24	3	0	0	3 HOURS	30	70	3

Image processing

Unit 1 Digital Image Fundamentals-Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures.

Unit 2 Image Enhancements and Filtering-Gray level transformations, histogramequalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domain sharpening filters – first and second derivative, two-dimensional DFT and its inverse, frequency domain filters – low-pass and high-pass.

Unit 3 Color Image Processing-Color models–RGB, YUV, HSI; Color transformations– formulation, color complements, color slicing, tone and color corrections; Color image smoothing and sharpening; Color Segmentation.

Unit 4 Image Segmentation- Detection of discontinuities, edge linking and boundarydetection, thresholding – global and adaptive, region-based segmentation.

Unit 5 Image Compression-Redundancy–inter-pixel and psycho-visual; Losslesscompression – predictive, entropy; Lossy compression- predictive and transform coding; Discrete Cosine Transform; Still image compression standards – JPEG and JPEG-2000.

Text Books:
1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education 3rd edition 2008
2. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India.2nd edition 2004

Reference Books:

3. Murat Tekalp , Digital Video Processing" Prentice Hall, 2nd edition 2015

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE31	3	0	0	3 HOURS	30	70	3

GRID AND CLOUD COMPUTING

UNIT I
Cloud Computing, Cloud Architecture, Cloud Storage, Advantages and Disadvantages of Cloud Computing, Companies inthe Cloud Today, Cloud Services, Web-Based Application.Ubiquitous computing, On-Demand Computing.Cloud Computing for theCommunity, Collaborating on Group Projects and Events, Cloud Computing for the Corporation.

UNIT II
Infrastructure as a Service: Introduction, Virtualization, Client and Server, Storage, RAID, IBM SAN, Infrastructure creation, Elastic Computing: Amazon Ec2, Computation Services, Case Study.

UNIT III
Platformas a Service: Microsoft AZURE, Google App Engine, Amazon Web Services, IBM Clouds, Software as a Service, IBM Websphere Cast Iron, Case studies.

UNIT IV
MapReduce, GFS, Hadoop, HDFS,Bigdata, business perspectives, IBM InfosphereBiginsight, Analytics of BigData, Infosphere Streams,

UNIT V
Grid Computing: History, Definition, Types, Architecture and GoalsApplications and Challenges of Grid Computing, Providers of Grid Computing. IBM Globus Toolkit, Grid Security Infrastructure, Open Grid Service Architecture.

Text Books:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work andCollaborate Online, Que Publishing, August 2008.

2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demandComputing.

Reference Books

3. ViktorsBerstis , Grid Computing : IBM Red Book
4. Understanding Bigdata, by Paul C. Zikopoulos et al. McGrawHill,
5. "Introduction to Grid Computing with Globus", Luis Ferreira et al. IBM Red Books

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE32	3	0	0	3 HOURS	30	70	3

MULTIMEDIA SYSTEM

UNIT 1: Introduction to Multimedia System: An overview of multimedia system and media streams architecture and components, synchronization & quality of service (QOS).

UNIT 2: Audio and Speech: Data acquisition, sampling and quantization, human speech, digital model of speech production, analysis and synthesis, psychoacoustics, low bit rate speech compression, MPEG audio compression.

UNIT 3: Images and Video: Image acquisition and representation, bi-level image compression standards: ITU (formerly CCITT) Group III and IV standards, JPEG image compression standards, MPEG, H.264/AVC video compression standards, Transcoding.

UNIT 4: Multimedia Communication: Fundamentals of data communication and networking, Bandwidth requirements of different media, Real time constraints: latency, video data rate, multimedia over LAN and WAN, Multimedia conferencing, video-on-demand broadcasting issues.

UNIT 5: Hypermedia Presentation: Authoring and publishing, Linear and non-linear presentation, Structuring Information, Different approaches of authoring hypermedia documents, Hyper-media data models and standards.

Text Book:

1. Jerry D. Gibson, Toby Berger, Tom Lookabaugh, Dave Lindergh and Richard L. Baker Digital Compression for Multimedia: Principles and Standards Elsevier, 2006.

2. Ralf Steinmetz and Klara Nahrstedt, Multimedia: Computing, Communications, and Application, Prentice Hall, 1995.

Reference Book:

3. Khalid Sayood Introduction to Data Compression 3rd Edition, Elsevier, 2006.

4. Asit Dan and Dinkar Sitaram Multimedia Servers Elsevier, 2006.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE33	3	0	0	3 HOURS	30	70	3

Speech and Natural Language Processing

UNIT 1 Sound : Biology of Speech Processing; Place and Manner of Articulation; Word Boundary Detection; Argmax based computations; HMM and Speech Recognition.

UNIT 2 Words and Word Forms : Morphology fundamentals; Morphological Diversity of Indian Languages; Morphology Paradigms; Finite State Machine Based Morphology; Automatic Morphology Learning; Shallow Parsing; Named Entities; Maximum Entropy Models; Random Fields.

UNIT 3 Structures : Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on Noisy Text as in Web documents; Hybrid of Rule Based and Probabilistic Parsing; Scope Ambiguity and Attachment Ambiguity resolution.

UNIT 4 Meaning : Lexical Knowledge Networks, Wordnet Theory; Indian Language Wordnets and Multilingual Dictionaries; Semantic Roles; Word Sense Disambiguation; WSD and Multilinguality; Metaphors; Coreferences.

UNIT 5 Applications : Sentiment Analysis; Text Entailment; Robust and Scalable Machine Translation; Question Answering in Multilingual Setting; Cross Lingual Information Retrieval (CLIR).

Text Books
1. Allen, James, Natural Language Understanding, Second Edition, Benjamin/Cumming, 1995.
2. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.

Reference Books
3. Jurafsky, Dan and Martin, James, Speech and Language Processing, Second Edition, Prentice Hall, 2008.
4. Manning, Christopher and Heinrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT06TPE34	3	0	0	3 HOURS	30	70	3

Graph Theory

Unit-I Preliminaries:Graphs, isomorphism, subgraphs, matrix representations,degree, operations on graphs, degree sequences.

Connected graphs and shortest paths: Walks, trails, paths, connected graphs, distance, cut-vertices, cut-edges, blocks, weighted graphs, connectivity, Dijkstra's shortest path algorithm, Floyd-Warshall shortest path algorithm

Unit-II Trees: Characterizations, number of trees, minimum spanning trees

Special classes of graphs : Bipartite graphs, line graphs, chordal graphs

Unit-III
Eulerian graphs: Characterization, Fleury's algorithm, chinese-postmanproblem

Hamilton graphs: Necessary conditions and sufficient conditions

Unit-IV
Independent sets, coverings and mathcings: Basic equations, matchings in bipartite graphs, perfect matchings, greedy and approximation algorithms

Vertexcolorings: Chromatic number and cliques, greedy coloring algorithm, coloring of chordal graphs, Brook's theorem

Edgecolorings: Gupta-Vizing theorem, Class-1 graphs and class-2 graphs, equitable edge-coloring.

Unit-V
Planar graphs :Basic concepts, Eulers formula, polyhedrons and planar graphs, charactrizations, planarity testing, 5-color-theorem Directed graphs: Directed graph, underlying graph, outdegree, in-degree, connectivity, orientation, Eulerian directed graphs, Hamilton directed graphs, tournaments

References:
Text Books:
1. J.A. Bondy and U.S.R.Murty: Graph Theory and Applications (
Freely downloadable from Bondy's website; Google-Bondy)
2. D.B.West: Introduction to Graph Theory, Prentice-Hall of
India/Pearson, 2009 (latest impression)

Reference Books:
1. J.A.Bondy and U.S.R.Murty: Graph Theory, Springer, 2008.
2. R.Diestel: Graph Theory, Springer(low price edition) 2000.

Syllabus

Semester - VII

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER VII
EFFECTIVE FROM SESSION 2021-22

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT07TPC01	CYBER SECURITY	3	0	0	30	70	100	3
2	IT07TPE4X	ELECTIVE – IV	3	0	0	30	70	100	3
3	IT07TPE5X	ELECTIVE – V	3	0	0	30	70	100	3
4	IT07TOE2X	OPEN ELECTIVE – II	3	0	0	30	70	100	3
PRACTICAL									
1	IT07PPC21	PROJECT-II	0	0	12	60	40	100	6
TOTAL CREDITS									18

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

LIST OF ELECTIVE-IV

1	IT07TPE41	ADVANCE DATABASE DESIGN
2	IT07TPE42	DATA MINING
3.	IT07TPE43	GAME THEORY
4.	IT07TPE44	GLOBAL STRATEGY AND TECHNOLOGY

LIST OF ELECTIVE-V

1	IT07TPE51	INTERNET OF THINGS
2	IT07TPE52	ADVANCE OPERATING SYSTEM
3.	IT07TPE53	COMPUTER VISION
4.	IT07TPE54	OPEN SOURCE SYSTEM & PROGRAMMING

LIST OF OPEN ELECTIVE-II

1	IT07TOE21	SOFT COMPUTING
2	IT07TOE22	INTRODUCTION TO DOT NET TECHNOLOGY
3.	IT07TOE23	GIS & Remote Sensing
4.	IT07TOE24	SUPPLY CHAIN MANAGEMENT

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TPC01	3	0	0	3 HOURS	30	70	3

CYBER SECURITY

UNIT I

A Model for Network Security Services, Mechanisms, and Attacks, Viruses & Worms, The OSI Security Architecture, symmetric cipher model, substitution techniques Transposition techniques, Steganography.

UNIT II

Block ciphers and the data encryption standard, simplified DES, Block cipher principles, The data Encryption Standard, Differential and Linear Cryptanalysis ,Block Cipher Design principles, The AES cipher, Triple DES, blowfish, RC5, Rc4 Stream Cipher

UNIT III

principles of public –Key Cryptosystems, public –Key cryptosystems, Requirements for public –Key Cryptosystems, The RSA Algorithm, Key management, key Distribution ,Hash Functions SHA, MD5, Diffie-Hellman Key Exchange Algorithm

UNIT IV

WEB & IP Security: Web Security Threats, SSL Architecture, SSL Record Protocol, Alert Protocol, Handshake Protocol, Transport Layer Security, Secure Electronic Transaction, IP Security

UNIT V

Intruders : Intrusion Techniques, Firewall Design principles, Block Chain Technology, BitCoin, Types of Firewalls.

Text Books:

1. Cryptography and Network Security, Principles and Practice Third edition, William Stallings.
2. Atul Kahate, " Cryptography and Network Security," TMH

Reference Book

3. Introduction to network security, Krawetz, Cengage

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TPE41	3	0	0	3 HOURS	30	70	3

ADVANCE DATABASE DESIGN

UNIT I PARALLEL AND DISTRIBUTED DATABASES

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism

UNIT II OBJECT AND OBJECT RELATIONAL DATABASES

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL/Oracle – Case Studies.

UNIT III INTELLIGENT DATABASES

Active Databases: Syntax and Semantics (Starburst, Oracle, DB2)- Taxonomy- Applications- Design Principles for Active Rules- Temporal Databases: Overview of Temporal Databases- TSQL2- Deductive Databases: Logic of Query Languages – Datalog- Recursive Rules- Syntax and Semantics of Datalog Languages- Implementation of Rules and Recursion- Recursive Queries in SQL- Spatial Databases- Spatial Data Types- Spatial Relationships- Spatial Data Structures-Spatial Access Methods- Spatial DB Implementation.

UNIT IV ADVANCED DATA MODELS

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Multimedia Databases- Information Retrieval- Data Warehousing- Data Mining- Text Mining.

UNIT V EMERGING TECHNOLOGIES

XML Databases: XML-Related Technologies-XML Schema- XML Query Languages- Storing XML in Databases-XML and SQL- Native XML Databases- Web Databases- Geographic Information Systems- Biological Data Management- Cloud Based Databases: Data Storage Systems on the Cloud- Cloud Storage Architectures-Cloud Data Models- Query Languages- Introduction to Big Data Storage-Analysis.

Text Books

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Fifth Edition, McGraw Hill, 2006.

Reference Books

4. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
5. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw Hill, Third Edition 2004

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TPE42	3	0	0	3 HOURS	30	70	3

DATA MINING

UNIT I

Data ware Housing: What is a data warehouse?, definition, Multidimensional data model, OLAP operation, warehouse schema, data ware housing architecture, warehouse serve, metadata, OLAP, engine, Data warehousing backend process, other features.

Data Mining: what is data mining? KDD Vs. data mining, DBMS Vs DM other related areas, DM techniques, other mining problem, issues & challenges in DM, Dm application areas.

UNIT II

Association rules: Methods to discover association rules, apriori algorithm ,partition algorithm, pincer –search algorithm, Dynamic Item set counting algorithm, FP-tree Growth algorithm, Incremental algorithm, Border algorithm, hierarchical association rule, generalized association rules, Association rules with item constraints.

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: Tree construction principal, Best spilt splitting indices, splitting criteria, Decision tree construction algorithm, CART, ID3, C4.5, CHAID, Decision tree construction with pre-sorting, rainforest, approximate method, CLOUDS, BOAT, pruning technique, integration of pruning & construction, Hierarchcal assocition rule.

UNIT V

Web Mining: Web mining ,web content mining ,web structure mining ,web usage mining ,text mining , unstructured text , Episode rule discovery for texts , Hierarchy of categories , text clustering , Paging algorithm.

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 –2001

Reference Book
3. Data Mining methods for knowledge Discovery –Cios , Pedrycz , swiniarski Kluwer academic publishers London –1998

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TPE43	3	0	0	3 HOURS	30	70	3

GAME THEORY

Unit 1

Introduction to game theory, routing games and mechanism design, Strategies, cost and payoffs; prisoner's dilemma, nash equilibrium, Strategic games; Best response; dominant Strategies; pure Strategy v/s mixed Strategy.

Unit 2

Repeated games; Bayesian games Routing games; Selfish routing; Quantifying inefficiency of equilibria; Price of Anarchy

Unit 3

Social optimum; price of stability; Scheduling games.
Population games; Evolutionary game theory;

Unit 4

Evolutionary stable Strategy; Replicator dynamics. Non cooperative games , cooperative game theory

Unit 5

Nash bargaining Mechanism design,Algorithmic mechanism design, distributed algorithmic mechanism design

TEXT BOOKs:

1.Game Theory,by D. Fudenberg and j.Tirole, MIT press 1991.
2.Algorithmic Game Theory, edited by N.nisan, T. Roughgarden, E.   Tardos, and v.v. vazirani,Cambridge University press 2007.

References books:

1.Auction Thoery, by v. Krishna, academic press,2002.
2.A course in Game theory, by M.J . Osborne,A.Rubinstein,MIT press,1994.
3.Dynamic Non cooperative Game Theory, byT Basar and G.J. Olsder,1999
4. Evolutionary Game Theory, Jorgen W.Weibull,The MIT presss 1997.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TPE44	3	0	0	3 HOURS	30	70	3

GLOBAL STRATEGY AND TECHNOLOGY

UNIT 1: Introduction to Global Strategy- What the motivations to expand abroad are and how firms can manage conflicting demands in terms of global integration, local responsiveness and worldwide learning. How Global are We? How global most MNCs are? The End of Corporate Capitalism Beyond Off shoring Distance Still Matters Going International.

UNIT 2: Location and Global Strategy: Home-Country Effects: Shifting global leadership in the watch industry Success of Swatch as a company in this industry Potential threat on the horizon that could once again cause the decline of the Swiss watch industry. Distance and Global trategy: Host Country Choices: The Globalization of CEMEX The benefits that CEMEX has derived from expanding across borders Challenges that CEMEX is likely to confront in the future How far can Cemex"s competitive advantage travel. Industry Characteristics and Global Strategy: Host - country choices: Characteristics of the global large appliances industry Design of an effective competitive strategy Haier"s current global strategy Good rationale for Haier to make global expansion its top strategic priority.

UNIT 3: International Corporate Governance: International Corporate Governance with Chinese Characteristics Corporate governance matters in China"s capital market Corporate governance model in China differ from international standards Special problems associated with Petro China"s corporate governance model Conditions required for further reforms in Petro China"s corporate governance system. Cross-cultural Negotiation: Learn from the MOUSE negotiation Issues/factors affect positively or negatively & the negotiation outcome Issues crucial in aligning different parties interests. Negotiators attitudes and culture in reaching the agreement The role of information acquisition in reaching an agreement in this negotiation. Foreign Market Entry Strategies: Issues around geographic market diversification and different strategies of internationalization Different entry modes into a foreign market Stages of internationalization International operations Tensions of a family owned enterprise going international.

UNIT 4: Technology: Productivity and Diffusion: Productivity Impact and Managing Diffusion Science, Technology and Productivity. Technology, Markets and Competition Incumbents and Entrants Commercialization Intellectual Property and Complementary Assets.

UNIT 5: Investing in R&D Capabilities: Incentives to Innovate Investing in basic/applied research; Real options and other approaches. Applying the Concepts and Frameworks; R&D Investment Decisions: Applying the NPV, Real Options and Scenario-Planning Frameworks.

Text/Reference Books:
1. Sumantra Ghoshal, "Global Strategy: an organizing framework." Strategic Management Journal (1987), pp.425-440.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TPE51	3	0	0	3 HOURS	30	70	3

Subject : IOT

UNIT I – OVERVIEW IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management

UNIT II – REFERENCE ARCHITECTURE IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

UNIT III – IOT DATA LINK LAYER & NETWORK LAYER PROTOCOLS PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), WirelessHART, Z-Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP

UNIT IV – TRANSPORT & SESSION LAYER PROTOCOLS Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT

UNIT V – SERVICE LAYER PROTOCOLS & SECURITY Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4 , 6LoWPAN, RPL, Application Layer

TEXT BOOKS

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014.

2. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI

3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer

REFERENCE BOOKS

4. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118- 47347-4, Willy Publications

5. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-onApproach)", 1 st Edition, VPT, 2014. 6. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.htm

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TPE52	3	0	0	3 HOURS	30	70	3

ADVANCED OPERATING SYSTEM

UNIT I
GENERAL OVERVIEW OF THE SYSTEM: Introduction to Multi user System, History of UNIX, features & Benefits, Variants, UNIX Commands - who, pwd, cd, mkdir, rm, rmdir, ls, mv, ln, chmod, cp, grep, tr, etc. Vi Editor: Command & edit Mode, Invoking Vi, deleting & inserting Line, Deleting & Replacing Character, Searching for Strings, Introduction to sed. Bourne Shell, C Shell, Shell Variables, Scripts, Meta Characters, If & CASE Statements, For, While and Until loops. AWK Pattern Scanning and Processing, AWK Arithmetic and Variables, built in functions and Operators, Arrays, Strings.

UNIT II
DESIGN OF OPERATING SYSTEM: System Structure, User Perspective, Operating System Services Assumption about Hardware, the Kernel and Buffer Cache Architecture of UNIX Operating System, System Concepts, Buffer Headers, Structure of the Buffer Pool, Scenarios for Retrieval of the Buffer, Reading and Writing Disk Blocks, Advantages and Disadvantages of Buffer Cache.

UNIT III
INTERNAL REPRESENTATION OF FILES: Overview of File system, System Calls for the File System,
INODES, Structure of Regular File, Directories, Conversions of a Path, name to an INODE, Super Block, INODE Assignment to a New File, Allocation of Disk Blocks. Open, Read, Write, File and Record Close, File Creation.

UNIT IV
STRUCTURES OF PROCESSES AND PROCESS CONTROL: Process States and Transitions Layout of System Memory, The Context of a Process, Manipulation of the Process Address Space, Sleep Process Creation/Termination, The User ID of a Process, Changing the Size of a Process.

UNIT V
DISTRIBUTED OPERATING SYSTEM: Design of distributed OS, Resource sharing, Distributed OS architectures, software layers, Architectural Model, The Operating System Layer, Protection, Processes and
Threads, Communication and invocation, Distributed File System: File Service Architecture, Sun Network
File System, the Andrew File System, and Recent Advances.

Text Books:
1. The Design of Unix Operating System, Maurice J. Bach, Pearson Education
2. Advance UNIX, a Programmer's Guide, S. Prata, BPB Publications, New Delhi.
3. Shell Programming, Yashvant Kanitkar, BPB Publications, New Delhi.

Reference Books:
4. UNIX Concepts and Applications, Sumitabh Das.
5. Distributed OS, A.S Tanenbaum, PHI.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TPE53	3	0	0	3 HOURS	30	70	3

Computer Vision

Unit-1

Recognition Methodology: Conditioning, Labeling, Grouping,Extracting, Matching.
Morphological Image Processing: Introduction, Dilation, Erosion,Opening, Closing,Hit-or-Miss transformation, Morphologicalalgorithm operations on binary images, Morphological algorithm Operations on gray-scale images, Thinning, Thickining, Regiongrowing, region shrinking.

Unit-2

Image Representation and Description: Representation schemes,Boundary descriptors, Region descriptors
Binary Machine Vision: Thresholding, Segmentation, Connectedcomponent labeling, Hierarchal segmentation, Spatial clustering,Split & merge, Rule-based Segmentation, Motion-based segmentation.

Unit-3

Area Extraction: Concepts, Data-structures, Edge, Line-Linking,Hough transform, Line fitting, Curve fitting (Least-square fitting).
Region Analysis: Region properties, External points, Spatialmoments, Mixed spatial gray-level moments, Boundary analysis:Signature properties, Shape numbers.

Unit-4

Facet Model Recognition: Labeling lines, Understanding linedrawings,Classification of shapes by labeling of edges, Recognition ofshapes, Consisting labeling problem, Back-tracking AlgorithmPerspective Projective geometry, Inverse perspective
Projection, Photogrammetry - from 2D to 3D, Image matching:Intensity matching of ID signals, Matching of 2D image,Hierarchical image matching.

Unit-5

Object Models And Matching: 2D representation, Global vs. Localfeatures
General Frame Works For Matching: Distance relational approach,Orderedstructural matching, View class matching, Modelsdatabase organization.

BOOKS
Text Books:
1.RobertHaralick and Linda Shapiro, "Computer and Robot Vision", Vol I, II, Addison-Wesley, 1993.
2. David A. Forsyth, Jean Ponce, "Computer Vision: A Modern Approach"
References Books:
3. 1. Milan Sonka,VaclavHlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision" Thomson Learning

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TPE54	3	0	0	3 HOURS	30	70	3

OPEN SOURCE SYSTEMS AND PROGRAMMING

UNIT 1

Open Source System Fundamentals: Open Source Operating Systems, Linux, GNU, POSIX standards, open source software development, open source licenses.Kernel, shell, memory management, Inter-process communication, file system, device drivers, Networking, modules and debugging.

UNIT 2

System Programming: System Calls, Library Functions, GNU C library, error handling, File I/O handling, process, IDs, memory layout, virtual memory, stack, command line arguments, memory allocation, user and groups, time, system limits and options, system and process information,

UNIT 3

File Systems: File I/O buffering, devices, I-nodes, Virtual file system, Mount point, file attributes, access control list, directories and links, monitoring file events, file locking

UNIT 4

Process: creation, termination, monitoring, execution, signals, handlers, timers, threads, process control, priorities and scheduling, daemons, secure privileged programs, capabilities, login accounting, shared libraries, pipes,

UNIT 5

Security: Security Policies, SE Linux,GRsecurity, tripwire, firewalls, network access control, authorization control, SSH, openSSH, protecting files and emails, testing and monitoring,

Text/References Books

1. "The Linux Programming Interface", Michael Kerrisk, nostarch press,
2. "Linux kernel programming", Michael Beck ET. Al., Pearson Education
3. "Linux Security Cookbook", Daniel J. Barrett ET. Al., O'Reilly publication,

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TOE21	3	0	0	3 HOURS	30	70	3

SOFT COMPUTING

Unit I: Introduction to Neural Network:

Concept, biological neural network, evolution of artificial neural network, McCulloch-Pitts neuron models, Learning (Supervise & Unsupervised) and activation function ,Models of ANNFeed forward network and feedback network, Learning Rules- Hebbian, Delta, Perceptron Learningand Windrow-Hoff,winnertakeall.

Unit II: Supervised Learning:

Perceptron learning,- Single layer/multilayer, linear Separability, Adaline, Madaline, Back propagation network, RBFN. Application of Neural network in forecasting, data compression and image compression.

Unit III: Unsupervised learning:

Kohonen SOM (Theory, Architecture, Flow Chart, Training Algorithm)Counter Propagation (Theory , Full Counter Propagation NET and Forward only counter propagation net),ART (Theory, ART1, ART2). Application of Neural networks in pattern and face recognition, intrusion detection,roboticvision.

Unit IV: Fuzzy Set:

Basic Definition and Terminology, Set-theoretic Operations, Member Function ,Formulation and Parameterization, Fuzzy rules and fuzzy Reasoning, Extension Principal and Fuzzy Relations, Fuzzy if-then Rules, Fuzzy Inference Systems. Hybrid system including neuro fuzzy hybrid, neuro genetic hybrid and fuzzy genetic hybrid, fuzzy logic controlled GA. Application of Fuzzy logic in solving engineering problems.

Unit V: Genetic Algorithm:

Introduction to GA, Simple Genetic Algorithm, terminology and operators of GA (individual, gene, fitness, population, data structure, encoding, selection, crossover, mutation ,convergence criteria). Reasons for working of GA and Schema theorem, GA optimization problem s including JSPP (Job shop scheduling problem), TSP (Travelling salesman problem), Network design routing ,timetabling problem.

Text Book

1. S.N. Shivnandam, "Principle of soft computing", Wiley.
2. S. Rajshekaran and G.A.V. Pai, "Neural Network , Fuzzy logic And Genetic Algorithm", PHI.

References Book: -

1. Jack M. Zurada, "Introduction to Artificial Neural Network System" JAico Publication.
2. Simon Haykins, "Neural Network- A Comprehensive Foudation"
3. Timothy J.Ross, "Fuzzy logic with Engineering Applications", McGraw-Hills 1

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TOE22	3	0	0	3 HOURS	30	70	3

INTRODUCTION TO .NET TECHNOLOGY

UNIT I

Introduction to .NET framework, Managed Code and the CLR- Intermediate Language, Metadata and JIT Compilation, Automatic Memory Management, CLR, The Framework Class Library, IDE of .Net, Introduction to C# Language

UNIT II

.Net Elements, Variables and constants, Data types, Operators , Loops and Program flow, Decision statements Type, Arrays with various types , Collections , Windows Forms , Windows controls – Button, Check box, Combo box, Label, List box, Radio Button, Text box, Various Events , Creating menus – menu items – context menu - Common dialog boxes & MDI

UNIT III

Architecture of ADO.NET – ADO.NET providers – Connection – Command – Data Adapter – Dataset, Connecting to Data Source, Accessing Data with Data set and Data Reader - Create an ADO.NET application - Using Stored Procedures.

UNIT IV

ASP.NET Features, IIS Configuration, ASP.Net Web Controls - HTML Controls, Using Intrinsic Controls, Using Input Validation Controls, Selecting Controls for Applications - Adding Web controls to a Page.

UNIT V

XML Serialization in the .NET Framework, Introduction to Web services and AJAX, Crystal Reports.

Text Books:

1. Introduction to Visual basic.NET - NIIT Prentice Hall of India,2005
2. Introducing Microsoft .NET- David S. Platt Microsoft Press", Saarc Edition, 2001
3. Introduction to Microsoft® ASP.NET Work Book - Microsoft- Microsoft Press

Reference Books:

4. Developing XML Web Services Using Microsoft® ASP.NET -Microsoft- Microsoft Press
5. Designing Microsoft ASP.NET Applications-Douglas J. Reilly-Microsoft Press
6. ASP.NET-Danny Ryan and Tommy Ryan-Hungry Minds Maran Graphics

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TOE23	3	0	0	3 HOURS	30	70	3

GIS & Remote Sensing

Unit 1: Overview of Information System, GIS Definitions and Terminology , Spatial Data Modeling , Stages of GIS Data Modeling, Graphic Representation of Spatial Data , Raster GIS Models , Vector GIS Models, GIS Data Management, GIS Data File Management , Database Models , Storage of GIS Data , Object Based Data Models

Unit2: GIS Types and Available GIS Software, remote sensing: remote sensing, platforms, sensors, resolution, satellites, multispectral, thermal, hyper spectral and Microwave sensing, GPS and its various terminology.

Unit3: Digital Image Processing: Preprocessing , Image Registration, Image Enhancement Techniques, Spatial Filtering Techniques, Image Transformations, Image Classification,

Unit4 : Working with oracle spatial, Overview of Oracle Spatial, Basic Spatial, Loading, Transporting, and Validating Spatial Data.

Unit5: Oracle Spatial and Network Analysis, Visualization, Spatial in Applications

TEXT BOOKS:

1. Remote Sensing and GIS Paperback by Basudeb Bhatta oxford univ press
2. Introduction to Geographic Information Technology, Sujit Choudhury , Deepankar Chakrabarti & Suchandra Choudhury
3. Pro Oracle Spatial for Oracle Database 11g, Ravikanth Kothuri

REFERENCE BOOKS:

1. ArcPy and ArcGIS - Geospatial Analysis with Python , Packt Publishing Limited, Toms Silas
2. Developing Mobile Web ArcGIS Applications ,Sheehan Matthew
3. Spatial Analysis, GIS and Remote Sensing, Gesler Albert
4. Learning ArcGIS for Desktop , Docan Daniela Cristiana Applying and Extending Oracle Spatial , Greener Simon

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT07TOE24	3	0	0	3 HOURS	30	70	3

SUPPLY CHAIN MANAGEMENT

UNIT I FUNDAMENTALS OF SUPPLY CHAIN MANAGEMENT Supply chain networks, Integrated supply chain planning, Decision phases in s supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models and modeling systems, Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.

UNIT II SCM STRATEGIES, PERFORMANCE Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics. Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

UNIT III PLANNING AND MANAGING INVENTORIES Introduction to Supply Chain Inventory Management. Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multiechelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models.

UNIT IV DISTRIBUTION MANAGEMENT Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain. Mathematical foundations of distribution management, Supply chain facility layout and capacity planning.

UNIT V STRATEGIC COST MANAGEMENT IN SUPPLY CHAIN The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction/Value/Profitability/Differential Advantage.

TEXT BOOKS
1. David Simchi-Levi, Philip Kaminsky, and Edith Simchi-Levi Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies, Second Edition, , McGraw-Hill/Irwin, New York, 2003. 31
2. Sunil Chopra and Peter Meindel. Supply Chain Management: Strategy, Planning, and Operation, Prentice Hall of India, 2002.

REFERENCE BOOKS
3. Sunil Chopra & Peter Meindl, Supply Chain Management , Prentice Hall Publisher, 2001
4. Robert Handfield & Ernest Nichols, Introduction to Supply Chain Management , Prentice hall Publishers, 1999.

Syllabus

Semester - VIII

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER VIII
EFFECTIVE FROM SESSION 2021-22

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT08TPC6X	ELECTIVE – VI	3	0	0	30	70	100	3
2	IT08TOE3X	OPEN ELECTIVE – III	3	0	0	30	70	100	3
3	IT08TOE4X	OPEN ELECTIVE - IV	3	0	0	30	70	100	3
PRACTICAL									
1	IT06PPC31	PROJECT-III	0	0	18	60	40	100	9
TOTAL CREDITS									18

IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL

LIST OF ELECTIVE – VI

1.	IT08TPE61	MACHINE LEARING
2.	IT08TPE62	OBJECT ORIENTED ANALYSIS & DESIGN
3.	IT08TPE63	SOFTWARE TESTING & QUALITY MANAGEMENT
4.	IT08TPE64	HUMAN COMPUTER INTERFACE

LIST OF OPEN ELECTIVE –III

1.	IT08TOE31	WIRELESS SENSOR NETWORK
2.	IT06TOE32	DIGITAL SIGNAL PROCESSING
3.	IT06TOE33	INFORMATION TECHNOLOGY FOR AUTOMATION
4.	IT06TOE34	REAL TIME SYSTEM

LIST OF OPEN ELECTIVE-IV

1.	IT08TOE41	ARTIFICIAL INTELIGENCE
2.	IT08TOE42	ECONOMIC POLICIESIN INDIA
3.	IT08TOE43	COMPUTER APPLICATION IN SOCIAL SCIENCE
4.	IT08TOE44	MANAGING INNOVATION & ENTERPRENEURSHIP

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT08TPE61	3	0	0	3 HOURS	30	70	3

MACHINE LEARNING

UNIT I

INTRODUCTION Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II

NEURAL NETWORKS AND GENETIC ALGORITHMS Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III
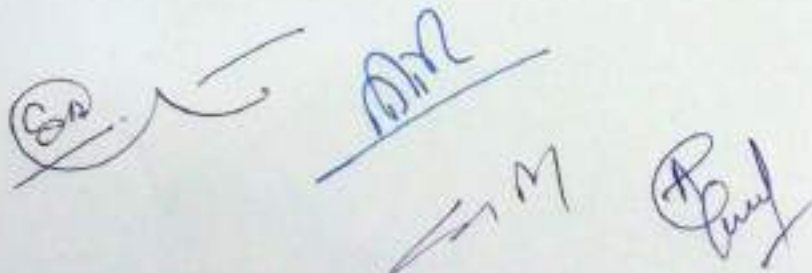
BAYESIAN AND COMPUTATIONAL LEARNING Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV

INSTANT BASED LEARNING 9 K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

UNIT V

ADVANCED LEARNING Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.

TEXT BOOK:

1. Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCES:

1. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2. Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT08TPE62	3	0	0	3 HOURS	30	70	3

Object Oriented Analysis and Design

UNIT I OBJECT MODELING :

Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, candidates keys, constraints.

UNIT II DYNAMIC MODELING :

Events and states, operations, nested state diagrams and concurrency, advanced dynamic modeling concept, a sample dynamic model.

UNIT III FUNCTIONAL MODELING :

Data flow diagram, specifying operations, constraints, a sample functional model. OMT (Object modeling techniques) methodologies, SA/SD, JSD

UNIT IV UNIT I: Introduction to UML

Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT V: Architectural Modeling

Architectural Modeling : Component, Deployment, Component diagrams and Deployment diagrams.

Text Books

1. James Rumbaugh et al " object Oriented Modeling and design" PHI
2. Herbert Schieldt " The complete Reference : Java" TMH
3. E. Balagurusamy " Programming in Java", TMH

Reference Books :

1. Booch Grady, " Object Oriented Analysis & design with application 3/e", Person
2. Bjarne Stroustrup " C++ Programming Language" Addison Wesley
3. E Balagurusami " Object Oriented Programming with C++, TMH

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT08TPE63	3	0	0	3 HOURS	30	70	3

SOFTWARE TESTING AND QUALITY MANAGEMENT

UNIT I

Software Quality: Ethical Basis for software Quality , Total quality Management Principles, Software Processes and Methodologies , Quality Standards , Practices & conventions, Top Down and Bottom Up Approach.

UNIT II

Software managementReviews and Audits, Enterprise Resource Planning Software, Measurement Theory , Software Quality Metrics, designing Software Measurement Programs , Organizational Learning.

UNIT III

Improving Quality with methodologies: Structured information Engineering , Object-Oriented Software , Reverse Engineering , Measuring Customer Satisfaction Defect Prevention , Reliability Models , Reliability Growth Models .

UNIT IV

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.

UNIT V

Project Configuration management: Configuration Management Concepts, Configuration Management Process, Document Control, Configuration Management plan of the WAR Project.

Text Books:

1. Stephan Kan, Metrics and Models in Software quality, Addison Wesley.
2. Mark Paulik, The capability Maturity Model-guidelines for improving the software Process, Addison Wesley.
3. Michael, Deutsch. Willis, Ronald r-Software Quality Engineering- A Total Technical and Management approach, Prentice Hall.
4. Ginac, Frank P, Customer Oriented Software Quality Insurance, Prentice Hall.

Reference Books:

5. Wilson, Rodney C, Software RX secrets of Engineering Quality Software, Prentice Hall.
6. Pressman, Software Engineering-A practitioner's approach
7. Pankaj Jalote, CMM Project

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT08TPE64	3	0	0	3 HOURS	30	70	3

HUMAN COMPUTER INTERFACE

UNIT1: Introduction0 The human, The computer, The interaction, Paradigms, Usability of Interactive Systems, Guidelines, Principles, and Theories

UNIT2: Design Process- Interaction design basics, HCI in the software process, Design rules, Implementation support, Evaluation techniques, Universal design, User support

UNIT3: Models and Theories0 Cognitive models, Socio-organizational issues and stakeholder requirements, Communication and collaboration models, Task analysis, Dialogue notations and design, Models of the system, Modelling rich interaction

UNIT4: Interaction Styles- Direct Manipulation and Virtual Environments, Menu Selection, Form Filling and Dialog Boxes, Command and Natural Languages, Interaction Devices, Collaboration and Social Media Participation

UNIT5: Design Issues- Quality of Service, Balancing Function and Fashion, User Documentation and Online Help, Information Search, Information Visualization

Text Books:
1. "Human Computer Interaction" by Alan Dix, Janet Finlay , ISBN :9788131717035, Pearson Education (2004)
2. "Designing the User Interface - Strategies for Effective Human Computer Interaction", by Ben Shneiderman
ISBN : 9788131732557, Pearson Education (2010).

Reference Books:
1. Usability Engineering: Scenario-Based Development of Human-Computer Interaction , by Rosson, M. and
Carroll, J. (2002)
2. The Essentials of Interaction Design, by Cooper, et al. , Wiley Publishing(2007)
3. Usability Engineering, by Nielsen, J. Morgan Kaufmann, San Francisco, 1993, ISBN 0-12-518406-9
4. The Resonant Interface: HCI Foundations for Interaction Design , by Heim, S. , Addison-Wesley. (2007)
5. Usability engineering: scenario-based development of human-computer interaction, By Rosson, M.B &
Carroll, J.M. , Morgan Kaufman.(2002)

SUB CODE	L	T	P	DURATION/WEEK	I A	ESE	CREDITS
IT06TOE31	3	0	0	3 hours	3 0	70	3

Subject : WSN

UNIT I – FUNDAMENTALS OF SENSOR NETWORKS

Introduction to computer and wireless sensor networks , Motivation for a network of Wireless Sensor nodes- Sensing and sensors-challenges and constraints - node architecture-sensing subsystem, processor subsystem-communication interfaces- prototypes, Application of Wireless sensors
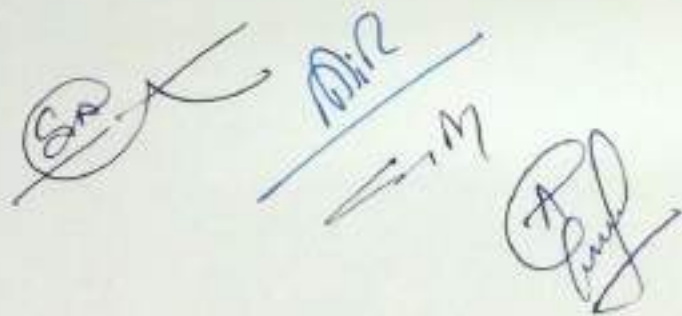
UNITII- COMMUNICATION CHARACTERISTICS AND DEPLOYMENT MECHANISMS

Wireless Transmission Technology and systems-Radio Technology Primer-Available Wireless Technologies - Hardware- Telosb, Micaz motes- Time Synchronization- Clock and the Synchronization Problem - Basics of time synchronization-Time synchronization protocols - Localization- Ranging Techniques- Range based Localization-Range Free Localization- Event driven Localization

UNIT III- MAC LAYER

Overview-Wireless Mac Protocols-Characteristics of MAC protocols in Sensor networks – Contention free MAC Protocols-characteristics- Traffic Adaptive Medium Access-Y-MAC, Low energy Adaptive Clustering - Contention based MAC Protocols- Power Aware Multi-Access with signalling

UNIT IV- ROUTING IN WIRELESS SENSOR NETWORKS

Design Issues in WSN routing- Data Dissemination and Gathering-Routing Challenges in WSN - Flooding-Flat Based Routing – SAR, Directed Diffusion, Hierarchical Routing- LEACH, PEGASIS - Query Based Routing-Negotiation Based Routing- Geographical Based Routing- Transport layer-Transport protocol Design issues- Performance of Transport Control Protocols.

UNIT V - MIDDLEWARE AND SECURITY ISSUES

WSN middleware principles-Middleware architecture-Existing middleware - operating systems for wireless sensor networks-performance and traffic management - Fundamentals of network security-challenges and attacks - Protocols and mechanisms for security.

TEXT BOOKS

1. Waltenegus Dargie, Christian Poellabauer , "Fundamentals of Wireless Sensor Networks, Theory and Practice", Wiley Series on wireless Communication and Mobile Computing, 2011
2. Kazem Sohraby, Daniel manoli , "Wireless Sensor networks- Technology, Protocols and Applications", Wiley InterScience Publications 2010.

REFERENCE BOOKS

3. Bhaskar Krishnamachari , " Networking Wireless Sensors", Cambridge University Press, 2005
4. C.S Raghavendra, Krishna M.Sivalingam, Taiebznati , "Wireless Sensor Networks", Springer Science 2004.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT06TOE32	3	0	0	3 hours	30	70	3

Digital Signal Processing

UNIT I

Analysis of Discrete Time Signals and Systems: Discrete Fourier analysis, Classification, Discrete Time Fourier Transform (DTFT) & its properties, Inverse DTFT. Discrete Fourier Transform (DFT) & its Properties, Inverse DFT. Fast Fourier Transform, Properties, Types of FFT, N-point Radix-2 FFT, Inverse FFT. Discrete Linear Convolution, Circular Convolution, Fast Convolution, Frequency Response of LTI system using Discrete Fourier Analysis. Discrete Cosine Transform.

UNIT II

Implementation of Discrete-time Systems: Structures for the Realization of discrete-time systems, Structures for FIR systems: Direct, Cascade, Frequency Sampling & Lattice structures. Structures for IIR systems: Direct, Signal Flow Graphs & Transposed, Cascade, Parallel, Lattice & Lattice-Ladder structures. State space system analysis and structures.

UNIT III

FIR Filter Design: Symmetric and Anti-symmetric FIR filters, FIR Filter design by window method (Rectangular, Bartlett, Hamming, Hanning, Blackman and Kaiser window), Frequency Sampling method, Optimum approximation of FIR filters, Design of FIR differentiators, Design of Hilbert transformers.

UNIT IV

IIR Filter Design: Design of Discrete-time IIR filters from Continuous-time Filters: Filter design by Impulse invariant and bilinear transformation method: Butterworth, Chebyshev& Elliptic approximation Filter, Frequency transformation.

UNIT V

Multirate Digital Signal Processing: Introduction, Decimation, Interpolation, Sampling rate conversion by rational factor, Filter design and implementation for sampling rate conversion: Direct form FIR digital filter structure, Polyphase filter structure, Time varying digital filter structure, Sampling rate conversion by an arbitrary factor.

Name of Text Books:
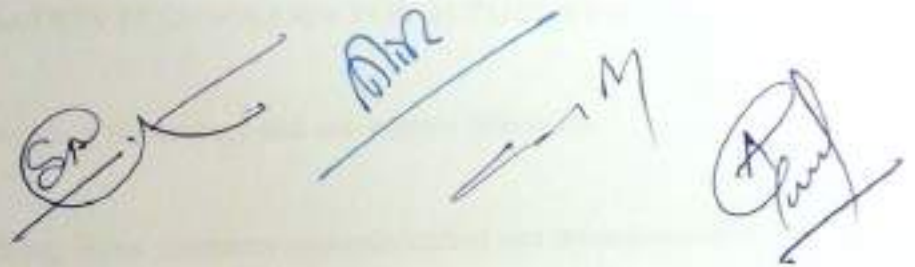1. Discrete Time Signal Processing by A.V. Oppenheim, R. W. Schafer, & John R. Buck, , 2nd Edition, Prentice Hall, 1999. (Unit I, Unit II, Unit III, Unit IV)
2. Digital Signal Processing: Principles, Algorithms and Applications by John G. Proakis& D.G. Manolakis, Prentice Hall, 1997. (Unit II, Unit III, Unit IV, Unit V)
3. Digital Signal Processing by S. K. Mitra, 3rd edition, McGraw-Hill, 2007. (Unit V)

Text/Reference Books:
1. Signals and Systems by A. V. Oppenheim, A. S. Willsky& S. H. NAWAB, 2nd edition, Prentice Hall, 1996.

2. Digital Signal Processing by S. Salivahanan, A. Vallavaraj, C. Gnanapriya, Tata McGraw-Hill, 2000.
3. Digital Signal Processing by A. Anand Kumar, PHI Learning Pvt. Ltd, 2012.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT06TOE33	3	0	0	3 hours	30	70	3

INFORMATION TECHNOLOGY FOR AUTOMATION

UNIT I
Basic concepts: Information science technology and automation principles

UNIT II
Computerization and networking: Basic computer communication and interconnection mechanism. Network topology. Networking protocols.

UNIT III
Industrial automation: Flexible manufacturing systems. .Process automation, Design of a distributed architecture for the information processing in different units, plants and factories in an industrial set up

UNIT IV
Office automation: Design and development of a centralized and distributed architecture in different administrative sectors of an organization (University, enterprises and Air traffic system)

UNIT V
Hospital information System: design of different inter connected modules for registration, medical consultancy, ward management, patient care and staff management in a hospital. Tele medicine: web based system for distant medical care.

List of Text/Reference Books:
1. Modern Industrial Automation Software design: Principles and Real-World Applications- By Ling Feng
Wong, Kay Chen Tan Publisher John Wiley and sons.
2. Software for automation: Architecture, Integration, and Security. By Jonas Berge, ISA

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT06TOE34	3	0	0	3 hours	30	70	3

REAL TIME SYSTEMS

Unit-I

Basic Real- Time Concepts, Computer Hardware, Language Issues: Basic component Architecture, terminology, Real Time Design Issues, CPU, Memories, Input- Output, Other Devices Language Features, Survey of Commonly Used Programming Languages, Code Generation

Unit-II

Software life cycle, Real Time Specification and Design Techniques, Real Time Kernels: Phases of software life cycle, Non-temporal Transition in the software life cycle, Spiral model, Natural languages, Mathematical Specification, Flow Charts, Structure Charts, Pseudocode and programmable Design Languages, Finite state Automata, Data Flow Diagrams, Petrinets, Statecharts, Polled Loop Systems, phase/State Driven Code, Coroutines, Interrupt Driven System, Foreground/Background Systems Full Featured Real Time OS

Unit-III

Intertask Communication and Synchronization, Real Time memory Management, System Performance Analysis and Optimization: Buffering Data, Mail boxes Critical Region, Semaphores, Event Flags and Signals, Deadlock, Process Stack Management, Dynamic Allocation, Static Schemes, Response Time Calculation, Interuupt Latency, Time Loading and its Measurement, Scheduling NP Complete, Relocating Response Times And time Loading, Analysis of Memory Requirements, Reducing Memory Loading, I/O Performance.

Unit-IV

Queuing Models, Reliability, Testing, And Fault Tolerance, Multiprocessing Systems: Basic Buffer size Calculation, Classical Queuing Theory, Little's Law, Faults, Failures ,bugs AND effects. Reliability, Testing, Fault Tolerence, Classification of Architectures, Distributed Systems, Non Von Neumann Architectures.

Unit-V

Hardware/ Software Integration, Real Time Applications: Goals of Real Time System Integration, Tools, Methodology, The Software Hesisenberg Uncertainity Principle, Real Time Systems As Complex System, First Real Time Application Real Time Databases, Real time Image Processing Real Time UNIX, building Real Time Applications with Real Time Programming Languages.

Text Books :

1. Real Time System, Jane W.S.Liu 2. Real Time Systems Design and Analysis by Phillip A. Laplante,PHI

Text/Reference Books:

1 Hard Real Time Computing Systems Predictable Scheduling Algorithms and applications by Giorgio C. Buttazzo
2 Real Time Design Patterns: Robust Scalable Architecture for Real Time System by BrucePowel Douglass 3. Real Time System: Scheduling, Analysis and Verification by Albert M.K. Change

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT08TOE41	3	0	0	3 hours	30	70	3

ARTIFICIAL INTELLIGENCE

UNIT I Overview & Search Techniques:

Introduction to AI, Problem Solving, State space search, Blind search: Depth first search, Breadth first search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Constraint satisfaction, Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.

UNIT II Knowledge Representation (KR):

Introduction to KR, Knowledge agent, Predicate logic, WFF, Inference rule & theorem proving forward chaining, backward chaining, resolution; Propositional knowledge, Boolean circuit agents. Rule Based Systems, Forward reasoning: Conflict resolution, backward reasoning; Use of Back tracking, Structured KR: Semantic Net - slots, inheritance, Frames- exceptions and defaults attached predicates, Conceptual Dependency formalism and other knowledge representations.

UNIT III Handling uncertainty & Learning:

Source of uncertainty, Probabilistic inference, Bayes' theorem, Limitation of naïve Bayesian system, Bayesian Belief Network (BBN), Inference with BBN, Dempster-Shafer Theory, Fuzzy Logic, Fuzzy function, Fuzzy measure, Non monotonic reasoning: Dependency directed backtracking, Truth maintenance systems. Learning: Concept of learning, Learning model, learning decision tree, Paradigms of machine learning, Supervised & Unsupervised learning, Example of learning, Learning by induction, Learning using Neural Networks.

UNIT IV Natural Language Processing (NLP) & Planning:

Overview of NLP tasks, Parsing, Machine translation, Components of Planning System, Planning agent, State-Goal & Action Representation, Forward planning, backward chaining, Planning example: partial-order planner, Block world.

UNIT V Expert System & AI languages:

Need & Justification for expert systems- cognitive problems, Expert System Architectures, Rule based systems, Non production system, knowledge acquisition, Case studies of expert system. Ai language: Prolog syntax, Programming with prolog, backtracking in prolog, Lisp syntax, Lisp programming.

Text Books:-
1. Artificial Intelligence by Elaine Rich and Kevin Knight, Tata McGraw Hill. 2. Introduction to Artificial Intelligence and Expert Systems by Dan W.Patterson, Prentice Hall of India.

Reference Books:-
1. Principles of Artificial Intelligence by Nils J.Nilsson, Narosa Publishing house.
2. Programming in PROLOG by Clocksin & C.S. Melish, Narosa Publishing house. 3. Rule based Expert Systems-A practical Introduction by M. Sasikumar, S.Ramani, et. al., Narosa Publishing House.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT08TOE42	3	0	0	3 hours	30	70	3

ECCONOMIC POLICIES IN INDIA

Unit-I

National Income: Basic Concepts, Measurement of National Income and Difficulties; Domestic and National Product and their Components, National income at factor cost and at Market Prices, Real and nominal GNP;

Unit II

National Income and Welfare, Social Accounting and its significance, System of National Accounts; Measurement of national Income in India.

Unit III

Hours Classical Theory of Output and Employment – The Classical Postulates; Say's Law of Market, Full Employment – Demand for and Supply of Labour; Labour Supply and Money Wages; Unemployment and Wage Rigidity; Overall Equilibrium in the Basic Static Model (Goods, Labour & Money Markets).

Unit-IV

Keynesian Theory of Income Determination: Concepts and Functions; Two sector, Three sector and four sector Models of Income Determination; Investment Multiplier; Balanced Budget Multiplier; Keynesian Theory of Money and Interest; Basic two sector IS-LM Model.

Unit-V

Theories of Consumption: Keynesian Theory; Consumption Puzzle; Absolute Income Hypothesis, Relative Income Hypothesis, Permanent Income Hypothesis, Life Cycle Hypothesis.

Text Books

1. Mankiw, N. G. (2011): Macroeconomics, 6th edition, New York, Worth publishers
2. Fuller, Neil (2008): Principles of macroeconomics, Delhi, Overseas Press
3. Froyen, R. T. (2012): Macroeconomics: theories and policies. (8th edition), New Delhi, Pearson Education.
4. Blanchard, O. (2012): Macroeconomics. (4th edition), New Delhi, Pearson Education
5. Acemoglu, D. (2016): Macroeconomics, New Delhi, Pearson education India.
6. Branson, W. H. (2014): Macroeconomics: Theory and policy. (3rd edition), New Delhi, East-West press Pvt. Ltd.

REFERENCE BOOKS

7. Dornbusch, R.; Fisher, S. and Startz, R. (2015): Macroeconomics, (11th edition), New Delhi, Tata McGraw hill education India Pvt. Ltd.
8. Gordon, R. J. (2015): Macroeconomics, (12th edition), New Delhi Pearson education India Pvt. Ltd.
9. McConnell, C. R., and Gupta, H. C. (2012). Introduction to Macroeconomics. Tata McGraw-Hill Publishing Company 10. Shapiro, Edward. (2015): Macroeconomic analysis. (5th edition), New Delhi, Galgotia publication Pvt. Ltd.

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT08TOE43	3	0	0	3 hours	30	70	3

COMPUTER APPLICATION IN SOCIAL SCIENCES

Unit I: Information technology - definition, need, qualities, values freedom of information, information management, right to information - information society, globalization of communication, new frontiers of information technology Computer - Fundamentals of Computer Importance of Computer, Architecture of Computers Input output Devices, Central Processing Unit, hardware and software, applications of computers, classification of computer, classification of computer languages.

Unit – II: Computer Operating System: MS-DOS, Windows up to the latest versions, MS-Word, MS-Excel.

Unit-III: System Analysis : Preliminary survey, analysis of problems and laying down specifications, design development, testing and debugging, system analysis methods, data flow diagrams, structure chart, programme/system development process Internet - understanding internet, internet management, uses of internet - website, e-mail, information retrieval, security of data on internet.

Unit –IV: E-governance - meaning, growth, scope, problems, E-commerce - meaning, nature, processes, scope, problems and barriers, cyber crimes, satellite communication, video conferencing.

Unit V: MIS - meaning, nature, process - office automation: means and Uses - uses of information technology in public administration – planning and monitoring, improving services, transparency, empowering citizens by access to information, grievance redressal, training through computers.

Texts/references

1. E. Garrison Walters, The Essential Guide to Computing: The Story of Information Technology, Indian Edition (New Delhi: Prentice Hall, 2000)
2. Brian Williams and Stacy Sawyer, Using Information Technology, 9th Edition (New York: Career Edition, 2010)
3. Lawrence Snyder, Fluency with Information Technology: Skills, Concepts and Capabilities, 4th Indian Edition (New Delhi: Prentice Hall, 2010)
4. Jon Piot and Nicholas Carr, The Executive's Guide to Information Technology (New York: Wiley, 2007)
5. Carl V. Brown and others, Managing Information Technology, 7th Indian Edition (New Delhi: Prentice Hall, 2011)

SUB CODE	L	T	P	DURATION/WEEK	IA	ESE	CREDITS
IT08TOE44	3	0	0	3 hours	30	70	3

MANAGING INNOVATION AND ENTREPRENEURSHIP

UNIT 1: Introduction to Entrepreneurship: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies. Entrepreneurial growth and development.

UNIT 2: Creativity and Innovation: Creativity and Innovation: Concepts Shifting Composition of the Economy Purposeful Innovation & the 7 Sources of Innovative Opportunity The Innovation Process. Innovative Strategies : Strategies that aim at introducing an innovation. Innovation & entrepreneurship: Can they work together? Planning incompatible with Innovation & entrepreneurship.

UNIT 3: Entrepreneurial Motivation: Need for continuous learning & relearning Acquiring Technological Innovation Entrepreneurial motivation (nAch story) Achievement Motivation in Real life.. Case Study.

UNIT 4: International Entrepreneurship: Concepts and Nature of International Entrepreneurship. The changing International environment. Ethics and International Entrepreneurship. Strategic Issues in International Entrepreneurship.

UNIT 5: Problem Identification and Problem Solving: Problem Identification. Problem solving. Innovation and Diversification.

Text Books:
1. Martin, M.J., 1994, "Managing Innovation and Entrepreneurship in Technology based Firm", John Wiley.
2. Ettlie, J.E., 2000, "Managing Technology Innovation", John Wiley & Sons.
3. Drucker, P. F. (2000), "The Discipline of Innovation," Harvard Business Review, May, (originally published
1985, May-June, 63(3), 67-72.1
4. Christensen, C. M. and Raynor, M. E. (2003), The Innovator"s Solution: Creating and Sustaining Successful Growth, Boston, MA: Harvard Business School Press.

Reference Books:
5. Drucker, P. F. (1985), Innovation and Entrepreneurship, New York: Harper.
6. Harvard Business Review on Innovation (Collection of articles), Harvard Business School Press (2001).
6. Harvard Business Review on Entrepreneurship (Collection of articles), Harvard Business School Press (1999)
8. Rogers, E.M. (2003), Diffusion of Innovations, 5th ed., New York: Simon and Schuster.