| BSH-121 | Credits | L | T | P |
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| | 4 | 3 | 1 | 0 |

# BSH-121 - ENVIRONMENTAL STUDIES

**Environment and ecology:** Segments of environment. Concept, structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem, food chains, food webs and ecological pyramids. Types, characteristic features, structure and function of terrestrial and aquatic ecosystem.

**Environmental Pollution:** Definition, cause, effects and control measures of Air pollution, Water pollution and Land pollution. Smog (Oxidizing & Reducing), Acid rain, Green house effect, Ozone depletion, BOD, COD, Eutrophication, and Solid-waste management.

**Green Chemistry:** Introduction, Principles of green chemistry, Introduction to green solvents and green catalysis: Water, Ionic liquid, $CO_2$, bio-catalysis.

**Green technologies:** Photochemistry, Sonochemistry, and Microwave assisted reactions.

**Renewable energy resources:** Solar, Wind, Hydro, Geothermal, Ocean, Fuel cells.

**Books:**

1. G. M. Matlers, Introduction to Environmental Engg. & Sciences, Prentice Hall of India Pvt. Ltd.
2. B. J. Novel, Environmental Sciences, Printice Hall Inc.
3. A.K. De, Environmental Chemistry, New Age International (P) Ltd., 5th Ed.
4. Thomas G. Spiro, William M. Stigliani, Chemistry of the Environment, 2nd Edition Prentice Hall of India pvt. Ltd.
5. S. V. S Rana, Essential of Ecology and Environmental Sciences, 4th Edition, PHI, Learning Pvt. Ltd.
6. S.S Dara, Environmental chemistry and Pollution Control, S. Chand & Company Ltd.
7. V. K. Ahluwalia, Green Chemistry: Environmentally Benign Reactions, Ane Books India, New Delhi, 2006.
8. M. M. Srivastava, R. Sanghi, Chemistry for Green Environment, Narosa, New Delhi, 2005
9. D. P. Kothari, Rakesh Ranjan, and K. C. Saigal, Renewable Energy Sources and Emerging Technologies, Prentice Hall of India Pvt. Ltd.
10. M.C. Das & P.C. Mishra, Man & Environment, McMillan India Ltd.

| ME-122 | Credits | L | T | P |
|---|---|---|---|---|
| | 4 | 3 | 1 | 0 |

# ME-122   ENGINEERING THERMODYNAMICS

**UNIT-I        BASIC CONCEPTS AND DEFINITION**
Thermodynamic  System, Surrounding and Universe, Phase, Microscopic and Microscopic Point of View, Thermodynamic Equilibrium, Property, state, Path, Quasi-static Process, Reversible and Irreversible process. Heat and work – Forms of work during quasi-static or reversible process, work as a path function, Heat, various  thermodynamic  processes.  Temperature  and  Zeroth  law  of thermodynamics, First law of thermodynamics- first law of thermodynamics undergoing cyclic process, first law of thermodynamics undergoing a process, Internal energy of a perfect gas, Application of first law to a closed system, First law of thermodynamics for flow process- flow processes and control volume, flow energy and flow work, first law of thermodynamics applied to open system, General study flow energy equation, application of study flow energy equation

**UNIT-II SECOND LAW OF THERMODYNAMICS**
Limitation of first  law and essence of second law, thermal reservoir, heat engine, thermal efficiency of heat engine, heat pump and co-efficient of performance, statement of second law, equivalence of Kelvin and clausius statement, types of Irreversibility, Carnot cycle, Corollary  1 & 2, Entropy -Clausius inequality, Entropy Principle, temperature and entropy diagram, application of entropy principle.

**UNIT-III   PROPERTIES OF PURE SUBSTANCE**
Properties of steam – types of steam, wet, saturated and superheated steam, phase transformation at constant pressure, T-s and  h-s  diagram, sensible heat, latent heat, superheat, internal energy, enthalpy, dryness fraction. Steam Processes – Constant volume, adiabatic, isothermal, polytropic,  entropy of steam.

**UNIT- IV  Vapour  Power cycle**
Carnot vapour cycle, rankine cycle , effect of operating conditions on ranking efficiency, principle  & method of increasing the thermal efficiency,  deviation of actual cycle from theoretical cycle, thermal efficiencies and specific steam consumptions, requirement of an ideal working fluid, the reheat cycle, binary vapour cycle

**UNIT-V  Gas power cycles  & Boilers**
 Air    Standard Cycle- Otto, Diesel and Dual, Comparison among cycles, Boilers, Types, Requirements of boiler, boiler efficiency, boiler mountings and accessories.

**Recommend Text Books**
   11. Engineering Thermodynamics  - P.K. Nag , TMH publisher.
   12. Engineering Thermodynamics – C.P. Arora,  TMH publisher.
   13. Engineering Thermodynamics  - Cengel, TMH, Publisher
   14. Engineering Thermodynamics  - Jones Dugan, PHI publisher
   15. Fundamentals of Engg Thermodynamics  -  R. Yadav, C. P House publisher
   16. Applied Thermodynamics – Onkar Singh, New Age Publishing Co.

| BSH-123 | Credits | L | T | P |
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# BSH 123 -BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

**Unit 1 - Dc Networks:** Kirchoff's Laws, node voltage and mesh current methods, star-delta transformation, classification of Network Elements, Superposition theorem, Thevenin and Norton theorems, maximum power transfer theorem, only independent sources, source conversion.

**Unit 2 - Single Phase AC Circuits:** RMS value, average value, form factor, solution of R,L,C series and parallel circuits, representation of impedance, phasor diagram, power in complex notation, series and parallel resonance.

Three phase AC Circuits: Delta and star connections, line and phase quantities, solution of three phase circuits, balanced supply voltage and balanced load, phasor diagram, measurement of power in three phase circuits.

**Unit 3 - Introduction of Electrical Machines –** Faradays's laws of electromagnetic induction, Single phase Transformer: Construction, emf equations, rating, phasor diagram on no load and full load, equivalent circuit, regulation, losses, efficiency, open and short circuit tests.

**Unit 4 - D.C.Machines:** Construction, emf and torque equations, classification and application and characteristics of DC motors, speed control.

Single and three phase Induction Motors: Construction, principle of operation, torque-slip curve, starting of single phase IM, application of three phase and single phase induction motors.

**Unit 5 - Semiconductor Devices:** V-I characteristics of P-N Junction diode, diode parameters, equivalent circuits, zener diode, working and characteristics, applications.Rectifiers: Analysis of half wave & full wave rectifier with resistive load, efficiency, ripple factor, filter circuits,

**Suggested Text Books and References:**

1. Electrical Technology by B.L.Theraja, volume 1 and 2.
2. Electrical Technology by Ian Mckenzie-Smith and Edward Hughes.
3. Basic Electrical Engineering by I.J.Nagrath (TMH)
4. Fitzrald and Higgonbothom: Basic Electrical Engineering, 5$^{th}$ Edition, MGH.
5. Del Torro, Vincent: Electrical Engineering Fundamentals, 2$^{nd}$ Edition, PHI.
6. Cotton H: Advance Technology, ISSAC Pitman, London.
7. Electronic principles: A. V. Malvino
8. Electronic Devices: Bell
9. Electronic Devices & Circuits: Sanjeev Gupta
10. Electronic Devices & Circuits: Robert. L. Boylestad

| BSH-124 | Credits | L | T | P |
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# BSH 124 - ENGINEERING PHYSICS

### Unit – I: Special Theory of Relativity

Reference frames, Concept of ether, Michelson- Morley experiment, Einstein's postulates, Lorentz Transformation, Length contraction, Time dilation, variation with velocity, and Mass-Energy equivalence.

### Unit – II: Interference and Diffraction of Light

Introduction of Interference, Young's experiment, theory of Interference, Coherent and non-coherent sources, Fresnel's Bi-prism, Newton's ring.

Introduction of diffraction, Fresnel and Fraunhofer diffraction, resultant of n harmonic waves, diffraction due to Plane diffraction grating.

### Unit – III: Electromagnetism

Coulomb's law and superposition principle, Electrostatics Field and potential, Electric Flux, Gauss's law and its Applications, Poisson's and Laplace's equations, Equation of continuity, Ampere's law and its Applications, Maxwell's Electromagnetic equations and their physical significance, Electromagnetic energy (Poynting Theorrem), Electromagnetic waves in free space.

### Unit – IV: Solid State Physics and Devices

Energy band gap of metals, insulators and semiconductors, Intrinsic and Extrinsic semiconductors, Fermi levels in intrinsic and extrinsic semiconductors, Electrical conductivity in conductors and semiconductors, Construction, working and Applications of P-N Junction diodes and transistor.

### Unit – V: Wave Mechanics and Laser

Introduction, wave-particle duality, De Broglie waves, Wave equation, Phase and Group Velocity, Davisson and Germer experiment.

Introduction, elementary idea of spontaneous and stimulated emission, active medium, population inversion, Einstein's coefficients, Applications of lasers.

### Text Book's and References

1) Engg. Physics by S. K. Srivastava and R. A. Yadav, New Age Pub. New Delhi
2) Engg. Physics by Uma Mukherjee, Narosa Publication
3) Engg. Physics by M. N. Avadhanulu, S. Chand Pub.
4) Engg. Physics by R. K. Gaur and S. L. Gupta, Dhanpat Rai 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

| BSH-125 | Credits | L | T | P |
|---------|---------|---|---|---|
| | 4 | 3 | 1 | 0 |

## BSH 125 - MATHEMATICS-II

**Unit-1: Linear Algebra:** Vector space, Linear dependence and Linear Independence Linear transformation, Rank & Inverse by elementary transformation, System of Linear equations-inconsistency, Eigen valve and Eigen vectors, Caley Hamilton theorem and its application to find inverse.

**Unit-II: Theory of Equations:** Polynomial & Polynomial equation, Division Algorithm, roots of equations, Reminder theorem, Factor theorem, Synthetic division, Fundamental theorem of Algebra. Multiplication of roots, Reciprocal equations, Symmetric function of the roots, Descarte's Rule of sign, Cardon's Method, Ferrari's Method Descarte's Method.

**Unit-III: Vector Calculus:** Vector functions, Differentiation of vectors, Velocity and acceleration, Scalar and vector field, Gradient of Scalar field, Directional derivative, properties of gradient, Divergence of vector, Point Function, curl of vector point function, properties of divergence and curl, Integration of vector function, Line integral, Surface Integral, Green, Gauss theorem and Stoke's theorem (without proof) and their simple applications.

**Unit-IV: Complex Number :** Complex number and its properties, conjugate complex number, Standard form of complex number, De Moivre's theorem, Root's of complex number, Exponential function of complex variable, Circular function of complex variable, Hyperbolic function of complex number, Logarthim of complex number $C + iS$ method of summation.

**Unit-V:** Sequence, Convergent, Divergent, Oscillating sequence, Infinite series, Ratio test, Root test, Comparison test, Raabe's Logarithmic test,

Couchy's Root test, Gauss's Test, Leibnitz Test Conditionally convergant.

| BSH-126 | Credits | L | T | P |
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## BSH 126 -BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

**List of Laboratory Experiments:**

1. Verification of Ohm's Law, KVL & KCL.

2. Verification of Superposition theorem.

3. Verification of Maximum Power Transfer Theorem.

4. Verification of Thevenin's and Norton's Theorem.

5. To Find power factor & circuit constants in R-L-C series circuit.

6. To find V-I characteristics of incandescent Lamp.

7. O.C. & S.C. Tests on single phase transformer.

8. Diode characteristics.

9. Half wave & Full wave Rectifier.

10. Study of Filters.

**List of books for laboratory:**

1.Laboratory courses in Electrical Engg: Tarnekar, Kharbanda, Bodkhe & Naik.

2.A text book of practicals in Electrical Engg: Dr. N.K.Jain

3.Electronics Practical Manuals.

| BSH-127 | Credits | L | T | P |
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# BSH 127 - ENGINEERING PHYSICS LAB

**List of Experiments**

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 wavelength of sodium light by Newton's ring method.

4. To determine the wavelength of sodium light by plane diffraction grating.

5. To demonstrate the diffraction pattern and determine the wavelength of different colors of mercury light using diffraction grating.

6. To determine the wavelength and number of lines 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 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. To study the FET characteristics and determine different parameters.

15. To study the MOSFET characteristics

**Text Book's and References**

1. Engg. Physics Practical by M. N. Avadhanulu, S. Chand Pub.

2. Unified Practical Physics by R. P. Goyal

3. Engg. Physics Practical by Ruby Das et. al.

4. Engg. Physics Theory & Experiments by S. K. Srivatava, New Age International

| WS-128 | Credits | L | T | P |
|--------|---------|---|---|---|
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## WS 128 - WORKSHOP PRACTICE

**Fitting Shop:**

Preparation of step cutting a job of 5mm thick strip.

Preparation of V-notch and V-groove out of 5mm thick strip.

Preparation of male female joint out of 5mm thick strip.

**Machine Shop:**

Job on Lathe with plane turning, facing, chamfering and step cutting operation.

Job on Shaper for finishing two sides of a job.

Job on Drilling machine – drilling holes of size 5mm and 12mm diameter on a job.

**Welding Shop:**

Preparation of Butt joint, Lap joint, T-joint, Corner joint from the given work piece using arc welding.

**Carpentry Shop:**

Prepare a simple Butt joint, Cross Lap joint, T-Lap joint, T-Hole joint and Mortise and Tenon joint.

**Smithy and Forging Shop:**

Forging principles, Study of operations like drawing, upsetting, bending and forge welding.

**Foundry Shop:**

Study of preparation of a mould of one piece pattern on the bench.

**Reference books:**

i.    Workshop Technology by Hajara Choudhary, Vol.-I & II.
ii.   Workshop Technology by B.S.Raghuwanshi, Vol.-I & II.
iii.  Manufacturing Process by H.S.Bawa, Vol.-I & II.