

B.Tech. II - I Sem.

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(13A54302) MATHEMATICS – III

Course Objective:

- To enable the students to understand the mathematical concepts of special functions & complex variables and their applications in science and engineering.

Learning Outcome:

- The student achieves the knowledge to analysis the problems using the methods of special functions and complex variables.

UNIT I

Special Functions: Gamma and Beta Functions – their properties – Evaluation of improper integrals. Series Solutions of ordinary differential equations (Power series and Frobenius Method).

UNIT II

Bessel functions – Properties – Recurrence relations – Orthogonality. Legendre polynomials – Properties – Rodrigue’s formula – Recurrence relations – Orthogonality.

UNIT III

Functions of a complex variable – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method.

Conformal mapping: Transformation of e^z , $\ln z$, z^2 , $\sin z$, $\cos z$, Bilinear transformation - Translation, rotation, magnification and inversion – Fixed point – Cross ratio – Determination of bilinear transformation.

UNIT IV

Complex integration: Line integral – Evaluation along a path and by indefinite integration – Cauchy’s integral theorem – Cauchy’s integral formula – Generalized integral formula.

Complex power series: Radius of convergence – Expansion in Taylor’s series, Maclaurin’s series and Laurent series. Singular point – Isolated singular point – Pole of order m – Essential singularity.

UNIT V

Residue – Evaluation of residue by formula and by Laurent series – Residue theorem.

Evaluation of integrals of the type

(a) improper real integrals $\int_{-\infty}^{\infty} f(x)dx$

(b) $\int_c^{c+2\pi} f(\cos \theta, \sin \theta) d\theta$

(c) $\int_{-\infty}^{\infty} e^{imx} f(x) dx$

Text Books:

- Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
- Advanced Engineering Mathematics, Peter V.O’Neil, CENGAGE publisher.

Reference Books:

- Mathematics III by T.K.V. Iyengar, S.Chand publications.
- Engineering Mathematics, Volume - III, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.
- Complex variables by Raisinghania
- Advanced Engineering Mathematics by M.C. Potter, J.L. Goldberg, Edward F.Aboufadel, and Oxford.

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(13A01403) ENVIRONMENTAL SCIENCE

Course Objective:

- To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

UNIT I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT II

ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem.
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION: Introduction - Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :

- Air Pollution.
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards

SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programme. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds – river, hill slopes, etc..

Text Books:

1. *Text book of Environmental Studies for Undergraduate Courses* by Erach Bharucha for University Grants Commission, Universities Press, 2005.
2. *Environmental Studies* by Palanisamy, Pearson education, 2012.
3. *Environmental Studies* by R.Rajagopalan, Oxford University Press, 2nd edition, 2011.

Reference Books:

1. *Textbook of Environmental Studies* by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications, 2nd edition, 2012.
2. *Text book of Environmental Science and Technology* by M.Anji Reddy, BS Publication, 2009.
3. *Comprehensive Environmental studies* by J.P.Sharma, Laxmi publications, 2nd edition, 2006.
4. *Environmental sciences and engineering* – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited, 2nd edition, 1996.
5. *Introduction to Environmental engineering and science* by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited, 3rd edition, 2007.

(13A01307) FLUID MECHANICS AND HYDRAULIC MACHINERY

UNIT I

INTRODUCTION: Dimensions and units – physical properties of fluids, specific gravity, viscosity, surface tension and capillarity, vapor pressure and their influences on fluid motion. Newtonian and non Newtonian fluids. Fluid Pressure at a Point; Pascal's law, Hydrostatic law, Atmospheric, Absolute and gauge pressure; Hydrostatic paradox, Pressure measurement manometers; Simple, differential and Micro Manometers

KINEMATICS OF FLUID MOTION: Methods of describing fluid motion; Classification of flow; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one dimensional flows; Irrotational and rotational flows; Streamline; Pathline; Streakline; Equation for acceleration; Convective acceleration; Local acceleration; Continuity equation; Velocity potential and stream function; Flownet.

UNIT II

DYNAMICS OF FLUID FLOW: Forces acting on a Fluid in Motion; Euler's equation of motion; Bernoulli's equation ; Energy correction factor; Momentum principle; Force exerted on a pipe bend. Discharge through Venturi Meter; Discharge through Orifice Meter; Discharge through flow nozzle; Measurement of velocity by Pitot tube, pitot-static tube.

CLOSED CONDUIT FLOW: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length; Hydraulic power transmission through a pipe; Siphon; Pipes in series, parallel & branched pipes.

UNIT-III

BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Torque and head transferred in roto dynamic machines.

HYDRAULIC TURBINES-I: Introduction, head and efficiencies of hydraulic turbines, Classification of turbines; pelton wheel: parts, Velocity triangles, work done and efficiency, working proportions, design of pelton wheel. Radial flow reaction turbines: velocity triangles and work done for inward radial flow turbine, degree of reaction, discharge, speed ratio, flow ratio.

UNIT IV

HYDRAULIC TURBINES-II: Francis turbine: main components and working, work done and efficiencies, design proportions; design of francis turbine runner. Kaplan turbine: main components and working, working proportions. Draft tube: theory and efficiency; specific speed, unit quantities, characteristic curves of hydraulic turbines. Cavitation: causes, effects.

CENTRIFUGAL PUMPS: Introduction, component parts and working of a centrifugal pump, work done by the impeller; heads, losses and efficiencies; minimum starting speed; Priming ;specific speed; limitation of suction lift, net positive suction head(NPSH);Performance and characteristic curves; Cavitation effects ;Multistage centrifugal pumps; troubles and remedies.

UNIT V

HYDRO ELECTRIC POWER STATION: Development of hydro power in Andhra Pradesh and India; Classification of hydel plants- runoff river plants, storage plants and pumped storage plants; low, medium and high head schemes ;Investigation and planning; components of hydel schemes – fore bay, intake structure, surge tanks, penstocks ,power house, turbines-selection of suitable type of turbine, Scroll casing ,draft tube and tail race; assessment of available power; definition of gross head ,operating head ,effective head; , hydrographs, Flow duration curve; Power duration curve; Load duration curve; Load curve ; primary power and secondary power; installed capacity, dependable capacity; firm power, secondary power; power factor ;load factor, capacity factor ,utilization factor and Diversity factor.

Text Books:

1. *Hydraulics & Fluid Mechanics* by P. N. Modi & S. N. Seth; Standard Book house, New Delhi
2. *Fluid Mechanics & Hydraulic Machines* by Dr. R. K. Bansal; Laxmi Publications, New Delhi.

Reference Books

1. *Hydraulic Machines* by Jagdish Lal, Metropolitan.
2. *Fluid Mechanics* by A. K. Jain; Khanna Publishers, Delhi
3. *Fluid mechanics and fluid machines* by Rajput, S.Chand &Co.
4. *Fluid Mechanics & Fluid Power Engineering* by D.S. Kumar Kataria & Sons.
5. *Fluid Mechanics, Hydraulics and Hydraulic Machines* by K R Arora, Standard Publishers
6. *Engineering Fluid Mechanics* by Kumar K.L., Eurasia Publishing House (P) Ltd., New Delhi

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(13A04301) ELECTRONIC DEVICES AND CIRCUITS

Course Objective:

- To give understanding on semiconductor physics of the intrinsic, p and n materials, characteristics of the p-n junction diode, diode's application in electronic circuits, Characteristics of BJT, FET, MOSFET, characteristics of special purpose electronic devices.
- To familiarize students with DC biasing circuits of BJT, FET and analyzing basic transistor amplifier circuits.

Learning Outcome:

Upon completion of the course, students will:

- Analyze the operating principles of major electronic devices, its characteristics and applications.
- Design and analyze the DC bias circuitry of BJT and FET.
- Design and analyze basic transistor amplifier circuits using BJT and FET.

UNIT I

PN JUNCTION DIODE & ITS APPLICATIONS:

Review of semi conductor Physics n and p -type semi conductors, Mass Action Law, Continuity Equation, Hall Effect, Fermi level in intrinsic and extrinsic semiconductors, PN Diode Equation, Volt-Ampere (V-I) Characteristics, Temperature Dependence of V-I Characteristics, Ideal Versus Practical Static and Dynamic Resistances, Diode Equivalent circuits, Break down Mechanisms in semiconductor Diodes, Zener Diode Characteristics. PN Junction as a Rectifier, Half wave rectifier, ripple factor, full wave rectifier, Bridge Rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, π - section filter, Use of Zener Diode as a Regulator, Illustrative problems.

UNIT II

TRANSISTOR AND FET CHARECTERISTICS: Transistor construction, BJT Operation, BJT Symbol, Transistor as an Amplifier, Common Emitter, Common Base and Common Collector Configurations, Limits of Operation, BJT Specifications, The Junction Field Effect Transistor (Construction, Principle of Operation, Symbol) - Pinch-Off Voltage – Volt-Ampere Characteristics, FET as Voltage Variable Resistor, Comparison between BJT and FET, MOSFET- Basic Concepts, Construction, modes(depletion & enhancement), symbol, principle of operation, characteristics.

UNIT III

BIASING AND STABILISATION: Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Collector to Base Bias, Self Bias, Bias Stability, Stabilization against Variations in I_{CO} , V_{BE} and β , Bias Compensation Using Diodes and Transistors, Thermal Runaway, Condition for Thermal Stability in CE configuration, Biasing of FET – Source self bias, Biasing for zero current Drift, Biasing against Devices variation, Illustrative problems.

UNIT IV

SMALL SIGNAL ANALYSIS OF AMPLIFIERS (BJT & FET):

BJT Modeling using h-parameters, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Analysis of CE, CB and CC configurations using h-Parameters, Comparison of CB, CE and CC configurations, Simplified Hybrid Model, Millers Theorem, Dual of

Millers Theorem. Small Signal Model of JFET & MOSFET ,Small signal analysis of Common Source, and Common Drain Amplifiers using FET, Illustrative problems.

UNIT V

SPECIAL PURPOSE ELECTRONIC DEVICES:

Principle of Operation, and Characteristics of Tunnel Diode, Varactor Diode, Schottky Barrier Diode, Silicon Control Rectifier, Diac, Triac & Uni-Junction Transistor (UJT), Semiconductor photo devices - LDR, LED, Photo diodes & Photo transistors.

Text Books:

1. J.Millman and Christos.C.Halkias, Satyabrata, “Electronic Devices and Circuits”, TMH Third edition, 2012,
2. K .Lal kishore, “Electronic Devices and Circuits”, BSP. 2nd edition, 2005,

Reference Books:

1. R.L. Boylestad, “Introductory Circuit Analysis”, PEARSON, 12th edition, 2013
2. B.P.Singh and Rekha Singh, “Electronic Devices and Circuits”, PEARSON, 2nd Edition 2013.
3. David A. Bell, “Electronic Devices and Circuits”, Oxford University press ,5th Edition, 2008,.
4. Mohammad H.Rashid, “Electronic Devices and Circuits”, CENGAGE Learning
5. N.Salivahanan, and N.Suresh Kumar, “Electronic Devices and Circuits”, TMH, 3rd Edition, 2012
6. A. S. Sedra and K. C. Smith, “Microelectronic Circuits”, Oxford University Press, 5th Ed.

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(13A03304) ENGINEERING GRAPHICS

Course Objective:

- By studying the engineering drawing, a student becomes aware of how industry communicates technical information. Engineering drawing teaches the principles of accuracy and clarity in presenting the information necessary about objects.
- This course develops the engineering imagination i.e., so essential to a successful design, By learning techniques of engineering drawing changes the way one thinks about technical images.
- It is ideal to master the fundamentals of engineering drawing first and to later use these fundamentals for a particular application, such as computer aided drafting. Engineering Drawing is the language of engineers, by studying this course engineering and technology students will eventually be able to prepare drawings of various objects being used in technology.

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance- Conventions in Drawing-Lettering – BIS Conventions. Curves used in Engineering Practice.

- a) Conic Sections including the Rectangular Hyperbola- General method only,
- b) Cycloid, Epicycloid and Hypocycloid

UNIT II

Projection of Points & Lines: Principles of orthographic projection – Convention – First angle projections, projections of points, lines inclined to one or both planes, Problems on projections, Finding True lengths.

UNIT III

Projections of Planes: Projections of regular plane surfaces- plane surfaces inclined to one plane.

Projections of Solids: Projections of Regular Solids with axis inclined to one plane.

UNIT IV

Sections and Developments of Solids: Section Planes and Sectional View of Right Regular Solids- Prism, cylinder, Pyramid and Cone. True shapes of the sections. Development of Surfaces of Right Regular Solids-Prism, Cylinder, Pyramid, Cone.

UNIT V

Isometric and Orthographic Projections: Principles of isometric projection- Isometric Scale- Isometric Views- Conventions- Isometric Views of lines, Planes Figures, Simple solids (cube, cylinder and cone). Isometric projections of spherical parts. Conversion of isometric Views to Orthographic Views.

Text Books:

1. *Engineering Drawing*, N.D. Bhatt, Charotar Publishers
2. *Engineering Drawing*, K.L. Narayana & P. Kanniah, Scitech Publishers, Chennai

Reference Books:

1. *Engineering Drawing*, Johle, Tata McGraw-Hill Publishers
2. *Engineering Drawing*, Shah and Rana, 2/e, Pearson Education
3. *Engineering Drawing and Graphics*, Venugopal/New age Publishers
4. *Engineering Graphics*, K.C. John, PHI, 2013
5. *Engineering Drawing*, B.V.R. Gupta, J.K. Publishers

Suggestions:

1. *Student is expected to buy a book mentioned under 'Text books' for better understanding.*
2. *Students can find the applications of various conics in engineering and application of involute on gear teeth. The introduction for drawing can be had on line from:*
 - *Introduction to engineering drawing with tools – youtube*
 - *Http-sewor. Carleton.ca /- g kardos/88403/drawing/drawings.html*
 - *Conic sections-online. red woods.edu*

The skill acquired by the student in this subject is very useful in conveying his ideas to the layman easily.

INTEVA

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(13A02301) ELECTRICAL MACHINES -I

Course Objective:

- *Electrical machines course is one of the important courses of the Electrical discipline. In this course the different types of DC generators and motors which are widely used in industry are covered and their performance aspects will be studied.*

UNIT I

PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSION

Electromechanical Energy Conversion – Forces and Torque In Magnetic Field Systems – Energy Balance – Energy and Force in A Singly Excited Magnetic Field System, Determination of Magnetic Force - Co-Energy – Multi Excited Magnetic Field Systems.

UNIT II

D.C. GENERATORS -I

D.C. Generators – Principle of Operation – Constructional Features – Armature Windings – Lap and Wave Windings – Simplex and Multiplex Windings – Use of Laminated Armature – E. M.F Equation– Numerical Problems – Parallel Paths–Armature Reaction – Cross Magnetizing and De-Magnetizing AT/Pole – Compensating Winding – Commutation – Reactance Voltage – Methods of Improving Commutation.

UNIT III

D.C GENERATORS – II

Methods of Excitation – Separately Excited and Self Excited Generators – Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Causes for Failure to Self Excite and Remedial Measures-Load Characteristics of Shunt, Series and Compound Generators – Parallel Operation of D.C Series Generators – Use of Equalizer Bar and Cross Connection of Field Windings – Load Sharing.

UNIT IV

D.C. MOTORS

D.C Motors – Principle of Operation – Back E.M.F. – Circuit Model – Torque Equation – Characteristics and Application of Shunt, Series and Compound Motors – Armature Reaction and Commutation. Speed Control of D.C. Motors: Armature Voltage and Field Flux Control Methods. Ward-Leonard System–Braking of D.C Motors – Permanent Magnet D.C Motor (PMDC). Motor Starters (3 Point and 4 Point Starters) – Protective Devices–Calculation of Starters Steps for D.C Shunt Motors.

UNIT V

TESTING OF DC MACHINES

Losses – Constant & Variable Losses – Calculation of Efficiency – Condition for Maximum Efficiency. Methods of Testing – Direct, Indirect – Brake Test – Swinburne's Test – Hopkinson's Test – Field's Test – Retardation Test in a D.C. Motor Test

Text Books:

1. *Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd Edition, 2004.*
2. *Electrical Machinery Fundamentals by Stephen J Chapman, Mc Graw Hills, 2005.*

Reference Books:

1. *Performance and Design of D.C Machines* – by Clayton & Hancock, BPB Publishers, 2004.
2. *Electrical Machines* -S.K. Battacharya, TMH Edn Pvt. Ltd., 3rd Edition, 2009.
3. *Electric Machinery* – A. E. Fitzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th Edition, 2003.
4. *Electrical Machines* – M.V Deshpande, Wheeler Publishing, 2004.
5. *Electrical Machines* – P.S. Bimbhra., Khanna Publishers, 2011.
6. *Electromechanics – I* - Kamakshaiah S., Overseas Publishers Pvt. Ltd, 3rd Edition, 2004.

AMU

(13A01406) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Course Objective:

- *The object of the course to make the students understand the fluid flow concepts and get familiarity with flow measuring devices.*

LIST OF EXPERIMENTS:

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Varification of Bernoulli's equation.
8. Impact of jet on vanes.
9. Study of Hydraulic jump.
10. Performance test on Pelton wheel turbine.
11. Performance test on Francis turbine.
12. Efficiency test on centrifugal pump.

LIST OF EQUIPMENT:

1. Venturimeter Sutup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Hydraulic jump test setup.
10. Pelton wheel and Francis turbines.
11. Centrifugal pumps.

(13A02302) ELECTRICAL CIRCUITS AND SIMULATION LAB

PART-A: ELECTRICAL CIRCUITS

- 1) Verification of Thevenin's and Norton's Theorems
- 2) Verification of Superposition Theorem and Maximum Power Transfer Theorem
- 3) Verification of Compensation Theorem
- 4) Verification of Reciprocity, Millmann's Theorems
- 5) Locus Diagrams of RL and RC Series Circuits
- 6) Series and Parallel Resonance
- 7) Determination of Self, Mutual Inductances and Coefficient of Coupling
- 8) Z and Y Parameters
- 9) Transmission and Hybrid Parameters
- 10) Measurement of Active Power for Star and Delta Connected Balanced Loads
- 11) Measurement of Reactive Power for Star and Delta Connected Balanced Loads
- 12) Measurement of 3-Phase Power by Two Wattmeter Method for Unbalanced Loads

PART-B: PSPICE SIMULATION

- 1) Simulation of DC Circuits
- 2) DC Transient Response
- 3) Mesh Analysis
- 4) Nodal Analysis

NOTE:

- *PSPICE Software Package is Necessary.*
- *Eight Experiments are to be Conducted from PART-A and any two from PART-B*