

**Rajasthan Technical University, Kota**



**B.Tech.**

**1<sup>st</sup> and 2<sup>nd</sup> Semesters**

**(Common to all branches of Engineering)**

**Scheme**

**&**

**Syllabus**

**Effective from Session 2012-13**

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**Scheme of Teaching & Examination for I year B.Tech. I Semester**  
**Effective from the Session: 2012 – 2013**  
**(Common to all branches of Engineering)**

Sub Code	Subject	Number of Teaching Hours			Duration of Theory Paper (Hours)	Marks Allocation				
		L	T	P		Theory	Term Test	Sessional	Prac. Exam	Total
101	Communicative English	3	1	-	3	80	20			100
102	Engineering Mathematics-I	3	1	-	3	80	20			100
103	Engineering Physics-I	3	1	-	3	80	20			100
104	Engineering Chemistry	3	1	-	3	80	20			100
105	Basic Electrical & Electronics Engineering	3	-	-	3	80	20			100
<b>Total</b>		<b>15</b>	<b>04</b>	<b>-</b>	<b>-</b>	<b>400</b>	<b>100</b>			<b>500</b>
106	Engineering Physics Lab-I	-	-	2		-		45	30	75
107	Engineering Chemistry Lab			2				45	30	75
108	Electrical & Electronics Lab	-	-	2		-		60	40	100
109	Practical Geometry	-	-	3				60	40	100
110	Workshop Practice	-	-	2				60	40	100
111	Discipline & Extra curricular Activities	-	-	-				50	-	50
<b>Grand Total</b>		<b>15</b>	<b>04</b>	<b>11</b>	<b>-</b>	<b>400</b>	<b>100</b>	<b>320</b>	<b>180</b>	<b>1000</b>

(Total 30 periods per week)

**Scheme of Teaching & Examination for I year B.Tech II Semester**  
**Effective from the Session: 2012 – 2013**  
**(Common to all branches of Engineering)**

Sub Code	Subject	Number of Teaching Hours Per Week			Duration of theory Paper (Hours)	Marks Allocation				
		L	T	P		Theory	Term Test	Sessi onal	Prac. Exam	Total
201	Communication Techniques	2	-	-	3	80	20			100
202	Engineering Mathematics-II	3	1	-	3	80	20			100
203	Engineering Physics-II	2	1	-	3	80	20			100
204	Chemistry & Environmental Engineering	3	1	-	3	80	20			100
205	Engineering Mechanics	3	1	-	3	80	20			100
206	Fundamentals of Computer Programming	3	-	-	3	80	20			100
<b>Total</b>		<b>16</b>	<b>04</b>	<b>-</b>	<b>-</b>	<b>480</b>	<b>120</b>			<b>600</b>
207	Engineering Physics Lab-II	-	-	2		-		30	20	50
208	Chemistry & Environmental Engineering Lab	-	-	2		-		30	20	50
209	Computer programming lab	-	-	2				45	30	75
210	Machine Drawing	-	-	3		-		60	40	100
211	Communication Technique Lab	-	-	2		-		45	30	75
212	Discipline & Extra Curricular Activities	-	-	-		-		50	-	50
<b>Grand Total</b>		<b>16</b>	<b>04</b>	<b>11</b>	<b>-</b>	<b>480</b>	<b>120</b>	<b>260</b>	<b>140</b>	<b>1000</b>

(Total 31 periods per week)

**L** = Lecture, **T** = Tutorial, **P** = Practical

## 101 COMMUNICATIVE ENGLISH

### Unit 1

#### Grammar

1. Tenses
2. Passive Voice
3. Indirect Speech
4. Conditional Sentences
5. Modal Verbs

### Unit 2

#### Composition

1. Dialogue Writing
2. Paragraph and Precis Writing
3. Report, its importance and Report Writing

### Unit 3

#### Short Stories

1. The Luncheon: W.S. Maugham
2. How Much Land Does a Man Need?: Leo Tolstoy
3. The Last Leaf: O. Henry

### Unit 4

#### Essays

1. On the Rule of the Road: A. G. Gardiner
2. The Gandhian Outlook: S. Radhakrishnan
3. Our Own Civilisation: C.E.M. Joad

### Unit 5

#### Poems

1. The Unknown Citizen: W. H. Auden
2. The Character of A Happy Life: Sir Henry Wotton
3. No Men are Foreign: James Kirkup
4. If : Rudyard Kipling

### Suggested Readings

1. Communication Skills for Engineers and Scientists, Sangeeta Sharma & Binod Mishra, PHI Learning Pvt. Ltd.
2. English for Engineers: Made Easy, Aeda Abidi & Ritu Chaudhary, Cengage Learning, (New Delhi)
3. A Practical Course for Developing Writing Skills in English, J.K. Gangal, PHI Learning Pvt. Ltd., New Delhi.
4. Intermediate Grammar, Usage and Composition, Tickoo, A. E. Subramaniam & P. R. Subramaniam, Orient Longman (New Delhi)
5. The Written Word , Vandana R. Singh, Oxford University Press (New Delhi)

6. The Great Short Stories edited by D.C. Datta, Ram Narain Lal Publishers (Allahabad)
7. Professional Communication, Kavita Tyagi & Padma Misra, PHI Learning Pvt. Ltd., New Delhi.
8. “Learn Correct English: Grammar, Usage and Composition” by Shiv K. Kumar & Hemalatha Nagarajan, Pearson (New Delhi).
9. “Current English Grammar and Usage with Composition” by R.P. Sinha, Oxford University Press (New Delhi).
10. “Grammar of the Modern English Language”, by Sukhdev Singh & Balbir Singh, Foundation Books (New Delhi).

## **102 ENGINEERING MATHEMATICS-I**

### **Unit 1**

Differential Calculus: Asymptotes (Cartesian Coordinates Only), Curvature (Cartesian Coordinates Only), Concavity, Convexity and Point of Inflexion (Cartesian Coordinates Only), Curve Tracing (Cartesian and Standard Polar Curves-Cardioids, Lemniscates of Bernoulli, Limacon, Equiangular Spiral).

### **Unit 2**

Differential Calculus: Partial Differentiation, Euler’s Theorem on Homogeneous Functions, Approximate Calculations, Maxima & Minima of Two and More Independent Variables, Lagrange’s Method of Multipliers.

### **Unit 3**

Integral Calculus: Surface and Volumes of Solids of Revolution, Double Integral, Double Integral by changing into polar form, Areas & Volumes by Double Integration, Change of Order of Integration, Beta Function and Gamma Function (Simple Properties).

### **Unit 4**

Differential Equations: Differential Equations of First Order and First Degree - Linear Form, Reducible to Linear form, Exact Form, Reducible to Exact Form, Linear Differential Equations of Higher Order with Constant Coefficients Only.

### **Unit 5**

Differential Equations: Second Order Ordinary Differential Equations with Variable Coefficients, Homogeneous and Exact Forms, Change of Dependent Variable, Change of Independent Variable, Method of Variation of Parameters.

### **Suggested Readings**

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9th Edition.
2. Calculus and Analytical Geometry, Thomas and Finney, Narosa Publishing House. New Delhi.
3. A Text Book of Differential Equations, M. Ray and Chaturvedi, Students Friends & Co. Publisher, Agra.
4. Higher Engineering Mathematics, B.V. Ramana, Tata McGraw Hill.

5. Thomas Calculus, Maurice D. Weir, Joel Hass and others, Pearson, 11<sup>th</sup> Edition.

## **103 ENGINEERING PHYSICS-I**

### **Unit 1**

Interference of light

Michelson's Interferometer: Production of circular & straight line fringes, Determination of wavelength of light, Determination of wavelength separation of two nearby wavelengths.

Newton's rings and measurement of wavelength of light.

Optical technology: Elementary idea of anti-reflection coating and interference filters.

### **Unit 2**

Polarization of light

Plane circular and elliptically polarized light on the basis of electric (light) vector, Malus law.

Double Refraction: Qualitative description of double refraction phase retardation plates, quarter and half wave plates, construction, working and use of these in production and detection of circularly and elliptically polarized light.

Optical Activity: Optical activity and laws of optical rotation, Specific rotation and its measurement using half-shade and bi-quartz devices.

### **Unit 3**

Diffraction of light

Single slit diffraction: Quantitative description of single slit, position of maxima / minima and width of central maximum, intensity variation.

Diffraction Grating: Construction and theory, Formation of spectrum by plane transmission grating, Determination of wavelength of light using plane transmission grating.

Resolving power: Geometrical & Spectral, Raleigh criterion, Resolving power of diffraction grating and telescope.

### **Unit 4**

Elements of Material Science

Bonding in Solids: Covalent bonding and Metallic bonding.

Classification of Solids as Insulators, Semiconductors and Conductors.

Semiconductors: Conductivity in Semiconductors, Determination of Energy gap of Semiconductor.

X-Ray diffraction and Bragg's Law.

Hall Effect: Theory, Hall Coefficient and applications.

### **Unit 5**

Special Theory of Relativity

Postulates of special theory of relativity, Lorentz transformations, relativity of length, mass and time.

Relativistic velocity addition and mass-energy relation, Relativistic Energy and momentum.

### **Suggested Readings**

1. Fundamental of Optics, Jenkins and White, Fourth Edition, McGraw Hill.
2. Optics, Ajoy Ghatak, Third Edition, Tata McGraw Hill.
3. Concept of Modern Physics, A. Baiser, Fifth Edition, McGraw Hill.
4. Modern Physics, J. Morrison, Edition 2011, Elsevier.
5. Elements of Material Science and Engineering, Van Vlack, Sixth Edition, Pearson.

## **104 ENGINEERING CHEMISTRY**

### **Unit 1**

General Aspects of Fuel: Organic fuels, Origin, classification and general aspects of fossil fuels. Solid fuels, Coal, carbonization of coal, manufacturing of coke by Beehive oven and by product oven method. Liquid fuels, Composition of petroleum, advantages and refining of petroleum. Cracking, reforming, polymerization and isomerization of refinery products. Synthetic petrol, Bergius and Fischer Tropsch process. Knocking, octane number and anti-knocking agents. Gaseous fuels, Advantages, manufacturing, composition and calorific value of coal, gas and oil gas.

### **Unit 2**

Fuels Analyses: Ultimate and proximate analysis of coal, Determination of calorific value of solid and gaseous fuels by bomb and Junker's Calorimeter respectively. Calculations of calorific value based on Dulong's formula. Combustion, requirement of oxygen/ air in combustion process. Flue gas analysis by Orsat's apparatus and its significance.

### **Unit 3**

Polymers: Different methods of classification, basic ideas of polymerization mechanisms. Elastomers: Natural rubber, vulcanization, Synthetic Rubbers viz. Buna-S, Buna-N, Butyl and neoprene rubbers.

New Engineering Materials: Fullerenes: Introduction, properties, preparation and uses. Organic Electronic Materials (including conducting polymers- poly (p-phenylene), polythiophenes, Polyphenylene, vinylenes, polypyroles, polyaniline).

### **Unit 4**

Cement: Definition, Composition, basic constituents and their significance, Manufacturing of Portland cement by Rotary Kiln Technology, Chemistry of setting and hardening of cement and role of gypsum.

Glass: Definition, Properties, Manufacturing of glass and importance of annealing in glass making, Types of silicate glasses and their commercial uses, Optical fiber grade glass.

### **Unit 5**

Refractory: Definition, classification, properties, Requisites of good refractory and manufacturing of refractory. Preparation of Silica and fire clay refractory with their uses. Seger's (Pyrometric) Cone Test and RUL Test

Lubricants: Introduction, classification and uses of lubricants. Types of lubrication. Viscosity & viscosity index, flash and fire point, cloud and pour point, steam emulsification number, precipitation number and neutralization number.

**Suggested Readings**

1. The Chemistry and Technology of Coal, by J G Speigh, CRC Press
2. The Chemistry and Technology of Petroleum, by J G Speigh, CRC Press
3. Polymer Chemistry: An Introduction, Malcolm P. Stevens, Oxford University Press
4. Solid State Chemistry and Its Applications, Anthony R West, John Wiley & Sons
5. Lubricants and Lubrications, Theo Mang, Wilfeied, Wiley-VCH
6. Hand Book of Conjugated Polymers, Tejre A Skotheim and J. R. Reynolds, CRC Press

**105 BASIC ELECTRICAL & ELECTRONICS ENGINEERING****Unit 1**

Basic Concepts of Electrical Engineering: Electric Current, Electromotive force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction, Lenz's Law, Kirchhoff's laws, Network Sources, Resistive Networks, Series-Parallel Circuits, Node Voltage Method, Mesh Current Method, Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems.

**Unit 2**

Alternating Quantities: Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, Single Phase RLC Circuits, Introduction to 3-Phase AC System.

**Unit 3**

Rotating Electrical Machines; DC Machines: Principle of Operation of DC Machine as Motor and Generator, EMF Equation, Applications of DC Machines.

AC Machines: Principle of Operation of 3-Phase Induction Motor, 3-Phase Synchronous Motor and 3- Phase Synchronous Generator (Alternator), Applications of AC Machines.

**Unit 4**

Basic Electronics: Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behaviour of the PN Junction, PN Junction Diode, Zener Diode, Photovoltaic Cell, Rectifiers, L, C, & L-C filters, Bipolar Junction Transistor, Field Effect Transistor, Transistor as an Amplifier.

Digital Electronics: Boolean algebra, Binary System, Logic Gates and Their Truth Tables.

**Unit 5**

Communication Systems: Introduction, IEEE Spectrum for Communication Systems, Types of Communication, Amplitude and frequency Modulation.

Instrumentation : Introduction to Transducers: Thermocouple, RTD, Strain Gauges, Load Cell and Bimetallic Strip.

Introduction and classification of ICs.

**Suggested Readings**

1. Electrical and Electronic Technology by Edward Hughes et al, Pearson Publication



2. Basic Electrical & Electronics Engineering by V. Jagathesan, K. Vinod Kumar & R. Saravan Kumar, Wiley India.
3. Basic Electrical & Electronics Engineering by Van Valkenburge, Cengage learning Indian Edition
4. Basic Electrical and Electronics Engineering by Muthusubramaniam, TMH
5. Fundamentals of Electrical Engineering by Leonard S. Bobrow, Oxford University Press
6. Fundamentals of Electrical and Electronics Engineering by Ghosh, Smarajit, PHI India
7. Basic Electrical & Electronics Engineering by Ravish Singh, TMH
8. Basic Electronics Engineering by Vijay Baru et al, Dream Tech, New Delhi

### **106 ENGINEERING PHYSICS LAB-I**

1. To determine the wave length of monochromatic light with the help of Fresnel's biprism.
2. To determine the wave length of sodium light by Newton's Ring.
3. To determine the specific rotation of Glucose (Sugar) solution using a polarimeter.
4. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
5. To convert a Galvanometer in to an ammeter of range 1.5 amp. and calibrate it.
6. To convert a Galvanometer in to a voltmeter of range 1.5 volt and calibrate it.
7. To study the variation of a semiconductor resistance with temperature and hence determine the Band Gap of the semiconductor in the form of reverse biased P-N junction diode.
8. To study the variation of thermo e.m.f. of iron copper thermo couple with temperature.
9. To determine coherent length and coherent time of laser using He-Ne Laser.

### **107 ENGINEERING CHEMISTRY LAB**

1. Proximate analysis of solid fuel.
2. Experiments based on Bomb Calorimeter.
3. To determine the strength of Ferrous Ammonium sulphate solution with the help of  $K_2Cr_2O_7$  solution.
4. To determine the strength of  $CuSO_4$  solution with the help of hypo solution.
5. To determine the strength of NaOH and  $Na_2CO_3$  in a given alkali mixture.
6. Determination of Na/K/Ca by flame photometer in a given sample.
7. Determination of turbidity in a given sample.
8. To determine the flash and fire point of a given lubricating oil.
9. To determine the viscosity of a given lubricating oil by Redwood viscometer.
10. To determine cloud and pour point of a given oil.

## 108 ELECTRICAL AND ELECTRONICS LAB

### Electrical lab

1. Assemble house wiring including earthing for 1-phase energy meter, MCB, ceiling fan, tube light, three pin socket and a lamp operated from two different positions. Basic functional study of components used in house wiring.
2. Prepare the connection of ceiling fan along with the regulator and vary the speed.
3. Prepare the connection of single phase induction motor through 1-Phase Auto-transformer and vary the speed.
4. Prepare the connection of three phase squirrel cage induction motor through 3-Phase Auto-transformer and vary the speed.
5. Prepare the connection of Fluorescent Lamp, Sodium Vapour and Halogen Lamp and measure voltage, current and power in the circuit.

### Electronics lab

1. Identification, testing and application of Resistors, Inductors, Capacitors, PN-Diode. Zener Diode, LED, LCD, BJT, Photo Diode, Photo Transistor, Analog/Digital Multi- Metres and Function/Signal Generator.
2. Measure the frequency, voltage, current with the help of CRO.
3. Assemble the single phase half wave and full wave bridge rectifier & the analyse effect of L, C and L-C filters in rectifiers.
4. Study the BJT amplifier in common emitter configuration. Measure voltage gain plot gain frequency response and calculate its bandwidth.
5. Verify the truth table of AND, OR, NOT, NOR and NAND gates.

## 109 PRACTICAL GEOMETRY

1. (a) Lines, Lettering & Dimension (Sketch Book)  
(b) Scale-representative Fraction, Plan scale, Diagonal Scale, Vernier scales (In sheet) comparative Scale, & scale of chords (Sketch Book)
2. (a) Conic Section:-  
Construction of Ellipse, Parabola & Hyperbola by different methods (In sheet)  
(b) Engineering curves:-  
Construction of cycloid, Epicycloids, Hypocycloid and Involutives (In sheet) Archimedean and Logarithmic spiral, (Sketch book)
3. (a) Type of Projection, Orthographic Projection: First Angle and third Angle Projection (Sketch Book)  
(b) Projection of Points (Sketch Book)  
(c) Projection of Straight lines, different position of Straight lines, methods for determining True length, true inclinations and Traces of straight lines (Four problems in sheet and three problems in (Sketch Book)
- (d) Projection of Planes: Different positions of Plane lamina like.:- Regular polygon, circle three of planes (Four problems in Drawing sheet and three problems in Sketch Book.)
4. (a) Projection of Solids:- Projection of right and regular Polyhedron, Prisms, Pyramids and cone (Four Problem in Drawing sheet and there in Sketch Book.)

- (b) Section of Solids:- Projection of Frustum of a cone and pyramid, Projection of Truncated Solids (like Prism, Pyramid, Cylinder and Cone) in different positions.
5. (a) Development of Surfaces:- Parallel line and Radial line method for right, regular solids
- (b) Isometric Projections:- Isometric Scales, Isometric Axes, Isometric Projection of Solids.

### Suggested Readings

1. Engineering Drawing Geometrical Drawing - P.S.Gill, S.K.Katara & Sons.
2. Engineering Drawing, Dhanarajay A Jolhe ,Tata McGraw Hill.
3. Engineering Drawing, Basant Agarwal & CM Agarwal ,Tata McGraw Hill.
4. Engineering Drawing, N.D.Bhatt, Charotar Publishing House Pvt. Ltd.

## 110 WORKSHOP PRACTICE

### Carpentry Shop

1. T – Lap joint
2. Bridle joint

### Foundry Shop

1. Mould of any pattern
2. Casting of any simple pattern

### Welding Shop

1. Gas welding practice by students on mild steel flat
2. Lap joint by gas welding
3. MMA welding practice by students
4. Square butt joint by MMA welding
5. Lap joint by MMA welding
6. Demonstration of brazing

### Machine Shop Practice

1. Job on lathe with one step turning and chamfering operations
2. Job on shaper for finishing two sides of a job
3. Drilling two holes of size 5 and 12 mm diameter on job used / to be used for shaping
4. Grinding a corner of above job on bench grinder

### Fitting and Smithy Shop

1. Finishing of two sides of a square piece by filing
2. Tin smithy for making mechanical joint and soldering of joint
3. To cut a square notch using hacksaw and to drill three holes on PCD and tapping

### Suggested Readings

1. Mechanical Workshop Practice, K.C. John, PHI Learning New Delhi.
2. Elements of Workshop Technology Hajra & Choudhary,Media Promoters &Publisher.
3. Workshop Technology , W.A.J.Chapman, CBS Publisher & Distributor New Delhi.

## 111 DISCIPLINE & EXTRA CURRICULAR ACTIVITIES (DECA)

Component – A

Discipline:

25 Marks

The marks shall be deducted from this component for those who shall involve themselves in indiscipline/undesirable/Ragging activities or in case of penalty of marks imposed by Standing Disciplinary Committee (SDC) and approved by Head of the Institution concerned subject to a maximum of 25 marks.

**Component – B                                  Extra Curricular Activities:                                  25 Marks**

Marks shall be awarded for the participation of students in various Extra Curricular Activities organised by the respective institutions as per the following, subject to a maximum of 25 marks. In case student does not participate in any of the Extra Curricular Activities, he/ she shall be awarded zero(0) marks in DECA - Component B.

- (i) National Cadet Corps (NCC).
- (ii) National Service Scheme (NSS)
- (iii) Scouts & Guide
- (iv) Sports Activities
- (v) Literary Activities & model
- (vi) Cultural Activities
- (vii) Paper Presentation/ Participation in National Conferences/ Seminars/ Workshops etc.
- (viii) Blood Donation
- (ix) Participation in activities of College Annual day Celebration
- (x) Organising/ Participation/ Volunteer in different activities organised by the departments/ institute
- (xi) Organising/ Participation in activities of Students Chapters of ISTE, IE (I), IEEE, IETE, Vivekanand Kendra etc.

## **201 COMMUNICATION TECHNIQUES**

### **Unit 1**

Elements of Communication

1. Communication: Meaning, Importance and Process
2. Objectives of Communication
3. Media and Types of Communication

### **Unit 2**

Basics of Communication

1. Verbal and Non-Verbal Communication
2. Formal and Informal Channels of Communication
3. Qualities of Good Communication

### **Unit 3**

Skills of Communication

1. Barriers to Communication
2. Professional Communication

3. Interpersonal Communication and methods to improve it

#### **Unit 4**

##### Grammar

1. Subject-Verb Agreement (Concord)
2. Linking Words (Conjunctions)
3. Relative Clauses
4. Common Errors

#### **Unit 5**

##### Composition

1. Resume Writing
2. Business Letter Writing: Sales, Credit, Enquiry, Order, Claim, Complaint, Job Applications, etc.
3. E-mail messages
4. Telephone Etiquettes

##### **Suggested Readings**

1. Communication Skills for Engineers and Scientists, Sangeeta Sharma and Binod Mishra, PHI Learning Pvt. Ltd.(New Delhi)
2. English Grammar and Composition, Gurudas Mukherjee, Ane Books Pvt. Ltd.(New Delhi)
3. Current English Grammar and Usage with Composition, R.P. Sinha, Oxford University Press (New Delhi)
4. Effective Technical Communication, M Ashraf Rizvi, Tata McGraw Hill (New Delhi)
5. Business Communication, Meenakshi Raman & Prakash Singh, Oxford University Press (New Delhi)
6. Professional Communication, Aruna Koneru, Tata McGraw Hills, New Delhi.
7. A Practical Course for Developing Writing Skills in English, J.K. Gangal, PHI Learning Pvt. Ltd., New Delhi.
8. “Communicative English for Engineers and Professionals”, by Nitin Bhatnagar & Mamta Bhatnagar, Pearson (New Delhi).
9. “The Ace of Soft Skills”, by Gopalswamy Ramesh & Mahadevan Ramesh, Pearson (New Delhi)

## **202 ENGINEERING MATHEMATICS-II**

#### **Unit 1**

Coordinate Geometry of Three Dimensions: Equation of a sphere, Intersection of a sphere and a plane, tangent plane, Intersection of two spheres, orthogonality of two spheres, Right circular cone. Right circular cylinder.

#### **Unit 2**

Matrices: Rank of a matrix, Rank of matrix by reducing to normal forms, Consistency of systems of linear simultaneous equations and its solution, Eigen values and Eigen vectors, Cayley-

Hamilton theorem (without proof), Diagonalization of matrix.

### **Unit 3**

Vector Calculus: Scalar and vector field, differentiation & integration of vector functions, Gradient, Divergence, Curl and Differential Operator, Line, Surface and volume Integrals.

### **Unit 4**

Application of Vector Calculus: Green's Theorem in a Plane, Gauss's and Stoke's Theorem (without proof) and their Applications.

Fourier Series: Expansion of simple functions in Fourier Series, half range Fourier sine and cosine series, change of interval. Harmonic Analysis.

### **Unit 5**

Differential Equations: Series Solutions of Second Order Linear Differential Equations with Variable Coefficients (Complementary Functions only), Partial Differential Equations of First Order : Lagrange's Form, Standard Forms, Charpit's Method .

### **Suggested Readings**

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9<sup>th</sup> Edition.
2. Calculus and Analytical Geometry, Thomas and Finney, Narosa Publishing House N. Delhi.
3. A Text Book of Differential Equations, M.Ray and Chaturvedi, Students Friends & Co. Publisher, Agra.
4. Higher Engineering Mathematics, B.V.Ramana, Tata Mcgra Hill.
5. Mathematics for Engineers, Chandrika Prasad, Prasad Mudranalaya Allahabad.
6. Advanced Mathematics for Engineers, Chandrika Prasad, Prasad Mudranalaya Allahabad.

## **203 ENGINEERING PHYSICS-II**

### **Unit 1**

Quantum Mechanics: Compton effect & quantum nature of light, Derivation of time dependent and time independent Schrödinger's Wave Equation, Physical interpretation of wave function and its properties, boundary conditions, Particle in one-dimensional box.

### **Unit 2**

Applications of Schrödinger's Equation, Particle in three-dimensional box and Degeneracy, Barrier penetration and tunnel effect, Tunneling probability, Alpha Decay, Summerfield's Free electron gas model Postulates, Density of energy states, Fermi energy level.

### **Unit 3**

Coherence and Optical Fibres, Spatial and temporal coherence, Coherence length, Coherence time and 'Q' factor for light, Visibility as a measure of coherence, Spatial Coherence and size of the source, Temporal coherence and spectral purity, Optical fiber as optical wave-guide, Numerical aperture , maximum angle of acceptance and applications of Optical Fiber.

#### **Unit 4**

**Lasers and Holography:** Theory of laser action, Einstein's coefficients, Components of a laser, Threshold conditions for laser action; Theory, Design and applications of He-Ne and semiconductor lasers; Holography versus photography, Basic theory of holography, Basic requirement of a holographic laboratory; Applications of holography in microscopy and interferometry.

#### **Unit 5**

**Nuclear Radiation Detectors,** Characteristics of gas filled detectors: general considerations, Constructions, Working and properties of: Ionization chamber, proportional counter, G. M. Counter and Scintillation Counter.

#### **Suggested Readings**

1. Fundamental of Optics, Jenkins and White, Fourth Edition, McGraw Hill.
2. Optics, Ajoy Ghatak, Third Edition, Tata McGraw Hill.
3. Quantum Mechanics, Schiff, Third Edition, McGraw Hill.
4. Quantum Mechanics, Merzbacher, Third Edition, Wiley India.
5. Nuclear Physics: Principles and Applications, John Lilley, Wiley India.

### **204 CHEMISTRY & ENVIRONMENTAL ENGINEERING**

#### **Unit 1**

**Water:** Common Impurities of water Hardness of water, Determination of hardness by Clark's test and complexometric (EDTA) method, Numerical based on hardness and EDTA method, Municipal Water Supply: Requisites of potable water, Steps involved in purification of water, Sedimentation, coagulation, Filtration and Sterilization, Break point chlorination.

#### **Unit 2**

**Water Treatment:** Softening of water, Lime-Soda, Permutit (Zeolite) and Deionization (Demineralization) methods, Boiler troubles their causes, disadvantages and prevention: Formation of solids (Scale and Sludge), Carry over (Priming and Foaming), Corrosion and Caustic, Embrittlement. Numerical problems based on Lime-Soda and Zeolite softening methods.

#### **Unit 3**

**Basics of Environment:** Environmental Pollution, Environmental Acts and Regulations, Environmental Impact Assessment (EIA), Necessity and methodology of EIA. Renewable sources of energy, Potential & present status of renewable sources of energy in India. Functional concepts of Ecology, Basics of species, Ecosystem, Hydrological and chemical cycles, Energy flow in ecosystems. Biodiversity, population dynamics.

#### **Unit 4**

**Air Pollution, Noise Pollution and Solid Waste Management:** Air Pollution, Harmful effects of Air Pollution, Control of Air Pollution. Noise Pollution, Harmful effects of noise pollution, control of noise pollution. Global warming, Acid rain, Ozone depletion. Solid Waste

Management, Classification of solid waste, Collection, transportation, treatment, and disposal of solid waste. Economic recovery of solid waste. Sanitary landfill, on site sanitation.

### **Unit 5**

Water Pollution: Water pollution, Harmful effects of water pollution, control of water pollution. Waste water management, Treatment & disposal of wastewater. Reuse and saving in use of water, rain water harvesting.

Corrosion: Definition and its significance. Mechanisms of Chemical (Dry) and Electrochemical (Wet) corrosion. Protection from corrosion, Protective coatings, cathodic protection, sacrificial anode and modification in designs.

### **Suggested Readings**

1. Chemistry of water treatment, Samuel Faust & Osman M Aly, CRC Press
2. Boilers water treatment. Principles and Practice, Colin Frayne, CRC Press
3. Corrosion Understanding the Basic, by Joseph R Davis, ASM International
4. Atmospheric pollution, by W Buch , Tata McGraw Hill(TMh)
5. Introduction to Environmental Science, by G Tyler Miller and Scott Spoolman, Cengage Learning
6. Introduction to Environmental Engineering, by Mackenzie L Davis and David A Cornwell, Tata McGraw Hill(TMh)

## **205 ENGINEERING MECHANICS**

### **Unit 1**

Statics Of Particles and Rigid Bodies: Fundamental laws of mechanics, Principle of transmissibility, System of forces, Resultant force, Resolution of force, Moment and Couples, Varignon's Theorem, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem.

Virtual work: Principle of Virtual Work, Active forces and active force diagram.

### **Unit 2**

Centroid & Moment of Inertia: Location of centroid and center of gravity, Moment of inertia, Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite section, Polar moment of inertia, M.I of solid bodies.

Lifting Machines: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines; System of Pulleys, Simple wheel and axle, Wheel and differential axle, Weston's differential pulley block, Worm and worm wheel, Single purchase winch crab.

### **Unit 3**

Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction.

Belt Drive: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Length of belt, Ratio of tensions and power transmission by flat belt drives.

### **Unit 4**



Kinematics of Particles and Rigid Bodies: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration, Radial and transverse velocities and accelerations, Projectiles motion on plane and Inclined Plane, Relative Motion.

Kinetics of Particles and Rigid Bodies: Newton's laws, Equation of motion in rectangular coordinate, radial and transverse components, Equation of motion in plane for a rigid body, D'Alembert principle.

### **Unit 5**

Work, Energy and Power: Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Non-conservative Force, Conservation of energy.

Impulse and Momentum: Linear and angular momentum, Linear and angular impulse, Principle of momentum for a particle and rigid body, Principle of linear impulse and momentum for a particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular momentum, Angular momentum of rigid body.

### **Suggested Readings**

1. Vector Mechanics for Engineers, Beer and Johnston, Tata McGraw-Hill.
2. Engineering Mechanics, Hibbeler, Pearson Education.
3. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
4. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
5. Engineering Mechanics, Shames, Pearson Education.
6. Engineering Mechanics, Boresi and Schmidt, CL-Engineering.
7. Engineering Mechanics, Andrew Pytel & Kiusalas, Cengage Learning.

## **206 FUNDAMENTAL OF COMPUTER PROGRAMMING**

### **UNIT – 1**

Programming in C: Structure of C Program, Concept of Preprocessor, Macro Substitution, Intermediate code, Object Code, Executable Code. Compilation Process, Basic Data types, Importance of braces ( { } ) in C Program, enumerated data type, Identifiers, Scope of Variable, Storage Class, Constants, Operators & Expressions in C, Type Casting, printf ( ) and scanf ( ) with format specifiers, reading single character.

### **UNIT – 2**

Control Statements, Command Line Arguments, Arrays in C, Pointers, Using pointers to represent arrays, Pointer & address arithmetic. Structures, using typedef.

### **UNIT – 3**

Arrays of Structures & pointers, File Handling (fscanf, fprintf, feof, fopen, fclose, fread, fwrite only). Dynamic memory Allocation.

### **UNIT – 4**

Functions in C, Passing Parameters (By value & Reference), using returned data, Passing arrays,

structures, array of structures, pointer to structures etc., passing characters and strings, The void pointer.

### UNIT – 5

Stored Program Architecture of Computers, Storage Device- Primary Memory and Secondary Storage, Random, Direct, Sequential access methods. Concept of High-Level, Assembly and Low Level programming languages. Representing Algorithms through flow chart, pseudo code, step by step.

Number System: Data Representation, Concept of radix and representation of numbers in radix  $r$  with special cases of  $r=2, 8, 10$  and  $16$  with conversion from radix  $r_1$  to radix  $r_2$ .  $r$ 's and  $(r-1)$ 's complement, Representation of alphabets.

#### Suggested Readings

1. Ritchie & Kernighan, The C Programming language, 2nd Ed., PHI.
2. Dey & Ghosh, Computer Fundamentals and programming in C, Oxford.
3. Kamthane, Programming in C, 2nd Ed., Pearson.
4. Schildt, The Complete Reference, 4th Ed., TMH.
5. Balaguruswamy, Programming in ANSI C, 5th Ed., TMH.
6. V. Rajaraman, Fundamentals of Computers, 5th Ed. PHI, 2011.
7. Forouzan et.al, Computer Science, 3rd Ed. Cenage Learning.

### 207 ENGINEERING PHYSICS LAB-II

1. To determine the height of water tank with the help of a Sextant.
2. To determine the dispersive power of material of a Prism for Violet Red and yellow colours of Mercury light with the help of a spectrometer.
3. To measure the Numerical Aperture of an Optical Fibre.
4. To determine the ferromagnetic constants retentivity, permeability and susceptibility by tracing B-H curve using C.R.O.
5. To study the Charge & Discharge of a condenser and hence determine time constant (Both current and voltage graphs are to be plotted).
6. To determine the high resistance by method of leakage, using a Ballistic galvanometer.
7. To verify the expression for the resolving power of a Telescope.
8. To determine the specific resistance of the material of a wire by Carey Fosters bridge.
9. To determine the specific resistance of the material of a wire by Carey Fosters bridge.

### 208 CHEMISTRY & ENVIRONMENTAL ENGINEERING LAB

1. To determine the hardness of water by HCL method.
2. To determine the hardness of water by EDTA method.
3. Determination of CO<sub>2</sub> in a water sample.
4. Measurement of pH of a given sample by pH-meter.
5. To determine free and residual chlorine in a given water sample.
6. Measurement of dissolved oxygen in water.
7. Measurement of conductivity of a given sample by conductivity meter.

8. Measurement of fluoride in water.
9. Measurement of nitrate in water.
10. Determination of sulphate in water.
11. Evaluation of Reverse Osmosis(RO) Process by TDS measurement.

## **209 COMPUTER PROGRAMMING LAB**

S.No. Concept to be covered in the exercise

1. Simple OS Commands, vi editor, compiling program, compiler options, linking libraries.
2. Simple input output program, integer, real, character and string. (Formatted & Unformatted), Using Command Line Arguments.
3. Conditional statement (if, if-else-if, switch-case)
4. Looping & iterations (for, while, do-while, continue, break)
5. Using Arrays (one, two and three dimensional)
6. Using Structures and Union.
7. Program using Function (with and without recursion), passing parameters by value & reference.
8. Using pointers.
9. File handling.

## **210 MACHINE DRAWING**

Introduction to machine drawing

Dimensioning, locations and placing.

Orthographic projections: First & third angle methods

Sheet 1: Orthographic Projections (3 Problems)

Sheet 2: Sectional Views (3 Problems)

Sheet 3: Riveted joints, lap joints, butt joints, chain riveting, zig-zag riveting

Sheet 4: Screw fasteners, different threads, Nuts & bolts locking devices, set screws, foundation

Sheet 5: Bearing, Plumber block

Instructions on free hand sketches

List of free hand sketches

- Different type of lines
- Conventional representation of materials
- Screw fasteners
- Bearing: Ball, roller, needle, foot step bearing
- Coupling: Protected type, flange, and pin type flexible coupling
- Welded joints
- Belts and pulleys
- Pipes and pipe joints
- Valves

### **Suggested Readings**

1. Machine Drawing, Lakshminarayan, Jain Brothers.

2. Machine Drawing, N.D.Bhatt, Charotar Publishing House Pvt. Ltd.

## **211 COMMUNICATION TECHNIQUES LAB**

1. Phonetic Symbols and Transcriptions
2. Word Formation
3. Affixes
4. Listening and speaking Skills.
5. Words often Mis-spelt and Mis- Pronounced
6. One Word for Many.
7. Synonyms and Antonyms.
8. Seminar Presentation.
9. Group Discussion.
10. Job Interview

### **Suggested Readings and Packages**

1. Advanced Manual for Communication Laboratories and Technical Report Writing, D. Sudha Rani, Pearson, (New Delhi)
2. A Course in Phonetics and Spoken English, J. Sethi & P.V. Dhamija, PHI Learning Pvt. Ltd. (New Delhi)
3. English Language Laboratories: A Comprehensive Manual, Nira Konar, PHI Learning Pvt .Ltd. (New Delhi)
4. Communication Skills for Engineers and Scientists, Sangeeta Sharma and Binod Mishra, PHI Learning Pvt. Ltd.(New Delhi).
5. Oxford English Learning Package.(With CDs: Headway Series)
6. Tata McGraw Hills English Learning Package (With CDs)
7. "Oxford Advanced Learners' Dictionary" published by Oxford University Press (New Delhi)

## **212 DISCIPLINE & EXTRA CURRICULAR ACTIVITIES (DECA)**

### **Component – A**

### **Discipline:**

**25 Marks**

The marks shall be deducted from this component for those who shall involve themselves in indiscipline/undesirable/Ragging activities or in case of penalty of marks imposed by Standing Disciplinary Committee (SDC) and approved by Head of the Institution concerned subject to a maximum of 25 marks.

### **Component – B**

### **Extra Curricular Activities:**

**25 Marks**

Marks shall be awarded for the participation of students in various Extra Curricular Activities organised by the respective institutions as per the following, subject to a maximum of 25 marks. In case student does not participate in any of the Extra Curricular Activities, he/ she shall be awarded zero(0) marks in DECA - Component B.

- (i) National Cadet Corps (NCC).
- (ii) National Service Scheme (NSS)

- (iii) Scouts & Guide
- (iv) Sports Activities
- (v) Literary Activities & model
- (vi) Cultural Activities
- (vii) Paper Presentation/ Participation in National Conferences/ Seminars/ Workshops etc.
- (viii) Blood Donation
- (ix) Participation in activities of College Annual day Celebration.
- (x) Organising/ Participation/ Volunteer in different activities organised by the departments/ institute
- (xi) Organising/ Participation in activities of Students Chapters of ISTE, IE (I), IEEE, IETE, Vivekanand Kendra etc.

## Rajasthan Technical University, Kota

Scheme for B.Tech. Computer Science & Engineering-w.e.f. session 2012-13

III	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
		L	T	P		IA	TE	Total	
Course Code	Subject								Common with
3CS1A	Electronic Devices and Circuits	3			3	20	80	100	CS,IT
3CS2A	Data Structures and Algorithms	3			3	20	80	100	EE, EEE, EC, EIC, CS & IT
3CS3A	Digital Electronics	3			3	20	80	100	EE, EEE, EC, EIC, CS & IT
3CS4A	Linux and Shell Programming	3			3	20	80	100	EE, EEE, EC, EIC, CS & IT
3CS5A	Object Oriented Programming	3			3	20	80	100	CS,IT
3CS6A	Advanced Engineering Mathematics	3	1		3	20	80	100	EE, EEE, CS & IT
3CS7A	Electronic Devices Lab			3	3	45	30	75	CS,IT
3CS8A	Data Structures Lab			3	4	60	40	100	CS,IT
3CS9A	Digital Electronics Lab			2	3	30	20	50	CS,IT
3CS10A	C++ Programming			3	4	45	30	75	CS,IT
3CS11A	Unix Shell Programming			2	3	30	20	50	CS,IT
3CSDC	Discipline & extra Curricular Activities							50	
	Total	18	1	13				1000	

IV	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
		L	T	P		IA	TE	Total	
Course Code	Subject								Common with
4CS1A	Microprocessors and Interfaces	3			3	20	80	100	CS,IT
4CS2A	Discrete Mathematical Structures	3	1		3	20	80	100	CS,IT
4CS3A	Statistics and Probability Theory	3			3	20	80	100	CS,IT
4CS4A	Software Engineering	3			3	20	80	100	CS,IT
4CS5A	Principles of Communication	3			3	20	80	100	CS,IT
4CS6A	Principles of Programming Languages	3			3	20	80	100	CS,IT
4CS7A	Microprocessor Lab			3	3	60	40	100	CS,IT
4CS8A	Communication Lab			3	3	60	40	100	CS,IT
4CS9A	Computer Aided Software Engineering Lab			3	4	60	40	100	CS,IT
4CS10A	Business Entrepreneurship Development			2	3	30	20	50	
4CSDC	Discipline & extra Curricular Activities							50	
	Total	18	1	11				1000	

V	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
		Course Code	Subject Name (Revised)	L		T	P	IA	
5CS1A	Computer Architecture	3			3	20	80	100	CS, IT
5CS2A	Digital Logic Design	3	-		3	20	80	100	
5CS3A	Telecommunication Fundamentals	3	-	-	3	20	80	100	CS, IT
5CS4A	Database Management Systems	3			3	20	80	100	CS, IT
5CS5A	Operating Systems	3	-		3	20	80	100	CS, IT
5CS6.1A	Advanced Data Structure	3	-		3	20	80	100	CS, IT
5CS6.2A	Digital Signal Processing								CS, IT
5CS6.3A	Information Theory & Coding								CS, IT
5CS7A	DataBase Lab			3		60	40	100	CS, IT
5CS8A	System Design in UML Lab.	-	-	3		45	30	75	
5CS9A	Operating Systems Simulation Lab			3		60	40	100	CS, IT
5CS10	Digital Hardware Design Lab			3		45	30	75	CS, IT
5CSDC	Discipline & Extra Curricular Activities							50	CS, IT
		18	0	12				1000	

VI	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
		Course Code	Subject Name (Revised)	L		T	P	IA	
6CS1A	Computer Networks	3	-		3	20	80	100	CS, IT
6CS2A	Design and Analysis of Algorithms	3	-		3	20	80	100	CS, IT
6CS3A	Theory Of Computation	3			3	20	80	100	CS, IT
6CS4A	Computer Graphics and Multimedia Techniques	3			3	20	80	100	
6CS5A	Embedded System Design	3	-		3	20	80	100	
6CS6.1A	Advance Topics in Operating Systems	3	-		3	20	80	100	CS, IT
6CS6.2A	Artificial Intelligence								
6CS6.3A	Human Computer Interface								CS, IT
6CS7A	Java Programming Lab			3		45	30	75	CS, IT
6CS8A	Computer Graphics & Multimedia Lab			2		30	20	50	
6CS9A	Design and Analysis of Algorithms Lab.			3		60	40	100	CS, IT
6CS10A	Embedded System Design Lab.			2		45	30	75	
6CS11A	Humanities and Social Sciences			2		30	20	50	CS, IT
6CSDC	Discipline & Extra Curricular Activities							50	CS, IT
		18	0	12				1000	

VII	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
		Course Code	Subject Name (Revised)	L		T	P	IA	
7CS1A	Cloud Computing	3	-		3	20	80	100	Common to
7CS2A	Information System Security	3			3	20	80	100	CS, IT
7CS3A	Data Mining & Ware Housing	3			3	20	80	100	CS, IT
7CS4A	Computer Aided Design for VLSI	3	-		3	20	80	100	
7CS5A	Compiler Construction	3			3	20	80	100	
7CS6.1A	Advance DataBase Management Systems	3	-		3	20	80	100	
7CS6.2A	Robotics								
7CS6.3A	Data Compression Techniques								
7CS7A	Web Development Lab			2		30	20	50	
7CS8A	VLSI Physical Design Lab			3		45	30	75	
7CS9A	Compiler Design Lab			3		45	30	75	
7CSPR	Project-I			2		50		50	CS, IT
7CSTR	Practical Training*			2			100	100	CS, IT
7CSDC	Discipline & Extra Curricular Activities							50	CS, IT
		18	0	12				1000	

VIII	Computer Science and Engineering	Teaching Hrs			Exm Hrs	Max. Marks			Comments
		Course Code	Subject Name (Revised)	L		T	P	IA	
8CS1A	Mobile Computing	3			3	20	80	100	CS, IT
8CS2A	Digital Image Processing	3	-		3	20	80	100	CS, IT
8CS3A	Distributed Systems	3			3	20	80	100	
8CS4.1A	Hardware Testing & Fault Tolerance	3	-		3	20	80	100	CS, IT
8CS4.2A	Real Time Systems								CS, IT
8CS4.3A	Information Retrieval								CS, IT
8CS5A	Unix Network Programming & Simulation Lab			3		60	40	100	
8CS6A	FPGA Lab.			3		60	40	100	
8CS7A	Digital Image Processing lab			2		30	20	50	CS, IT
8CSPR	Project-II			2		120	80	200	CS, IT
8CSSM	Seminar			2		60	40	100	CS, IT
8CSDC	Discipline & Extra Curricular Activities							50	CS, IT
		12	0	12				1000	