# 1. FIRST YEAR B.Tech. Sem. I & II

## (CIVIL /MECHANICAL /ELECTRICAL)

## ACADEMIC SCHEME AND SYLLABUS

## Year 2015-16

**Scheme for First Year B.Tech. in Civil Engineering (Semester - I): Academic year: 2015-16**

| Sr. No. | Courses | Code | Course Plan for Each Week (Hrs) | | | Credits | Evaluation (Marks) | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lectures | Laboratory | Tutorial | | Test 1 | Test 2 | End Semester | | End Semester Weightage (%) | In Semester Evaluation | |
| | | | | | | | | | Marks | Duration (Hrs) | | | |
| 1 | Engineering Mathematics-I | BT101 | 4 | -- | -- | 4 | 20 | 20 | 100 | 3 | 60 | - | 100 |
| 2 | Basic Electrical and Electronics-I | BT102 | 3 | - | -- | 3 | 20 | 20 | 100 | 3 | 60 | -- | 100 |
| 3 | Engineering Graphics-I | BT103 | 3 | - | 2 | 4 | 20 | 20 | 100 | 3 | 60 | 25 | 125 |
| 4 | Engineering Mechanics-I | BT104 | 3 | - | -- | 3 | 20 | 20 | 100 | 3 | 60 | -- | 100 |
| 5 | Applied Physics-I | BT105 | 2 | -- | -- | 2 | 20 | 20 | 75 | 3 | 60 | -- | 85 |
| 6 | Applied Chemistry-I | BT106 | 2 | - | -- | 2 | 20 | 20 | 75 | 3 | 60 | -- | 85 |
| 7 | Communication Skills | BT107 | 2 | -- | 2* | 3 | 20 | 20 | 100 | 3 | 60 | 25 | 125 |
| Laboratory | | | | | | | | | | | | | |
| 8 | Basic Electrical and Electronics-I (Lab.) | BT152 | - | 2 | - | 1 | -- | -- | -- | -- | -- | 25# | 25# |
| 9 | Engineering Mechanics-I (Lab.) | BT154 | - | 2 | - | 1 | -- | -- | -- | -- | -- | 25# | 25# |
| 10 | Applied Physics-I (Lab.) | BT155 | -- | 2* | -- | 1 | -- | -- | -- | -- | -- | 15# | 15# |
| 11 | Applied Chemistry-I (Lab.) | BT156 | -- | 2* | - | 1 | -- | -- | -- | -- | -- | 15# | 15# |
| 12 | Workshop Practice-I | BT199 | -- | 3 | -- | 2 | -- | -- | -- | --- | -- | 50# | 50# |
| **Total** | | | **19** | **11** | **4** | **27** | **140** | **140** | **---** | **---** | | **180** | **850** |

1. Test 1, Test 2 and End semester weightage marks will be added and shown as the theory marks in the mark sheet.Duration of Test 1, Test 2 is of 1 hour.
2. For passing in theory courses, Student must secure minimum 40% marks in each course with all heads of passing taken together and minimum 40% marks in the end semester examination
3. Laboratory work is considered as separate head and student must secure 40 % of marks for passing.
4. # Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:
   (i) Attendance in Laboratory/Tutorial = 20%,
   (ii) Journal/Drawing sheet/Sketch book = 40%,
   (iii) MCQ/Oral/Test = 40%.
5. * Laboratory/Tutorials of these courses will be held on alternate weeks.

**Sardar Patel College of Engineering Andheri (West), Mumbai 400 058**
**Academic Book**
**Year: 2015-16**

**Scheme for First Year B.Tech. in Civil Engineering (Semester – II): Academic year 2015-16**

| Sr. No. | Courses | Code | Course Plan for Each Week (Hrs) | | | Credits | Evaluation (Marks) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lectures | Laboratory | Tutorial | | Test 1 | Test 2 | End Semester | | End Semester Weightage (%) | In Semester Evaluation | |
| | | | | | | | | | Marks | Duration (Hrs) | | | |
| 1 | Engineering Mathematics-II | BT201 | 4 | --- | --- | 4 | 20 | 20 | 100 | 3 | 60 | -- | 100 |
| 2 | Basic Electrical and Electronics-II | BT202 | 3 | -- | --- | 3 | 20 | 20 | 100 | 3 | 60 | -- | 100 |
| 3 | Engineering Graphics-II | BT203 | 1 | -- | -- | 3 | 20 | 20 | 100 | 3 | 60 | -- | 100 |
| 4 | Engineering Mechanics-II | BT204 | 3 | -- | --- | 3 | 20 | 20 | 100 | 3 | 60 | -- | 100 |
| 5 | Applied Physics-II | BT205 | 2 | --- | -- | 2 | 20 | 20 | 75 | 3 | 60 | -- | 85 |
| 6 | Applied Chemistry-II | BT206 | 2 | --- | --- | 2 | 20 | 20 | 75 | 3 | 60 | -- | 85 |
| 7 | Computer Programming | BT207 | 4 | -- | --- | 4 | 20 | 20 | 100 | 3 | 60 | -- | 100 |
| Laboratory | | | | | | | | | | | | | |
| 8 | Basic Electrical and Electronics-II (Lab.) | BT252 | -- | 2 | -- | 1 | -- | -- | -- | -- | -- | 25# | 25# |
| 9 | Engineering Graphics-II (Lab.) | BT253 | -- | 2 | -- | 1 | -- | -- | -- | -- | -- | 25# | 25# |
| 10 | Applied Physics-II | BT255 | -- | 2* | -- | 1 | -- | -- | -- | -- | -- | 15# | 15# |
| 11 | Applied Chemistry-II | BT256 | -- | 2* | -- | 1 | -- | -- | -- | -- | -- | 15# | 15# |
| 12 | Computer Programming | BT257 | -- | 2 | -- | 1 | -- | -- | -- | -- | -- | 25# | 25# |
| 13 | Workshop Practice-II | BT299 | --- | 3 | --- | 2 | --- | --- | --- | --- | --- | 50# | 50# |
| **Total** | | | **19** | **11** | **2** | **28** | **140** | **140** | **---** | **---** | | **155** | **825** |

1. Test 1, Test 2 and End semester weightage marks will be added and shown as the theory marks in the mark sheet.Duration of Test 1, Test 2 is of 1 hour.
2. For passing in theory courses, Student must secure minimum 40% marks in each course with all heads of passing taken together and minimum 40% marks in the end semester examination
3. Laboratory work is considered as separate head and student must secure 40 % of marks for passing.
4. # Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:
   (i) Attendance in Laboratory/Tutorial = 20%,
   (ii) Journal/Drawing sheet/Sketch book = 40%,
   (iii) MCQ/Oral/Test = 40%.
5. * Laboratory/Tutorials of these courses will be held on alternate weeks.

| **SEMESTER-I** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT101** | **COURSE: Engineering Mathematics –I** | | |
| **Prerequisites** | **Std. XII Mathematics** | | |
| Period per week (each of 60 minutes) | Lecture | 04 | |
| | Laboratory | --- | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | 01 | 20 X 02 |
| | End Semester* | 03 | 100 |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | --- |
| | **TOTAL** | **---** | **100** |

* 60% Weightage for end semester

**Course Objectives**

1. Introduce differential calculus, partial derivatives and its application to find maxima & minima, errors and approximations.
2. Introduce complex numbers, De-moivre's theorem and its application to find roots of complex numbers.
3. Introduce hyperbolic functions and vector calculus.

**Course Outcomes**

Upon successful completion of course, students should be able to

1. Find $n^{th}$ derivative of a function and product of functions. Find expansion of functions.
2. Determine angle between surfaces and scalar potential using vector calculus.
3. Compute partial derivatives of functions of many variables.

**Course Contents:**

| **Module No.** | **Details** | **Hrs.** |
|---|---|---|
| 1 | **Differential Calculus**<br>1.1. Successive differentiations, nth -derivative of Exponential, Trigonometric & Algebraic functions. Leibnitz's theorem (without proof)<br>1.2. Expansion of functions, Taylor's series, Maclaurin's series & Examples. | 9 |
| 2 | 2.1 Indeterminate forms $\frac{0}{0}$, $\frac{\infty}{\infty}$, $0\times\infty$, $\infty-\infty$, $1^{\infty}$, $0^{0}$, $\infty^{0}$ L' Hospital rule<br>2.2 Evaluation of limits using expansions of functions | 5 |
| 3 | **Partial Differentiations**<br>3.1 Partial differentiation, Differentiation of Composite & Implicit functions. | 9 |

| | | |
|---|---|---|
| | 3.2 Euler's theorem on Homogeneous function with two & three Independent variables (with proof), Deductions from Euler's theorem. | |
| 4 | 4,1 Errors & approximations,<br>4.2 Maxima & Minima of a function of two independent variables, Lagrange's method of undetermined multipliers with one constraint | 5 |
| 5 | **Complex Numbers**<br>5.1 Complex Numbers. Cartesian, Polar and exponential form of complex numbers. De- Moivre's Theorem<br>**5.2** Expansion of $\sin(n\theta)$, $\cos(n\theta)$ in terms of powers of $\sin\theta$ and $\cos\theta$. Expansion of $\sin^n\theta$ , $\cos^n\theta$ in terms of $\sin(n\theta)$, $\cos(n\theta)$ | 6 |
| 6 | 6.1 Circular and Hyperbolic functions. Inverse Circular and Inverse Hyperbolic functions.<br>6.2 Logarithmic functions , Roots of complex numbers | 10 |
| 7 | **Vector differentiation**<br>7.1 Scalar and vector point functions<br>7.2 Gradient, Divergence and curl, Solenoidal and Irrotational Vector Field .Properties of divergence curl gradient.Directional derivative ,angle between surfaces | 4 |

**Reference Books:-**

1. Erwin Kreyszig (2010), "Advanced Engineering Mathematics" Wiley EasternLimited, Singapore 10th edition, ISBN 0470458365,1280 Pages
2. Shanti Narayan (2005), "Differential Calculus", S.Chand Publications,30th Edition,ISBN 8121904714, 572 Pages
3. B S Grewal (2013), "Higher Engineering Mathematics", Khanna Publications, 43rd Edition, ISBN 8174091955, 1312 Pages

**Text Books:-**

1. G.V. Kumbhojkar "Applied Mathematics – I"
2. C. Jamanadas Ist edition.

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T-1 | Module 1 & 2 |
| 2 | T-2 | Module 3 & 4 |
| 3 | End Semester | Module 1 to 7 |

| **SEMESTER-I** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT102** | **COURSE: Basic Electrical and Electronics I** | | |
| **Prerequisites** | **Std. XII Physics** | | |
| Period per week (each of 60 minutes) | Lecture | 03 | |
| | Laboratory | --- | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | 01 | 20*2 |
| | End Semester* | 03 | 100 X 01 |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | --- |
| | **TOTAL** | **---** | **100** |

*60% Weightage for end semester

**Course Objectives:**

1. Introduction to electrical circuits and its analysis.
2. To impart knowledge on solving electrical circuits using network theorems.
3. To draw phasor diagrams and to make analysis of three phase circuits.
4. Introduction to single phase transformers motors and meters.

**Course Outcomes:**

The course will give the students

1. Ability to analyse electrical circuits
2. Ability to apply circuit theorems
3. Ability to analyse ac and dc electrical circuits
4. Aware of electrical machines and meter.

**Course Contents:**

| **Module** | **Details** | **Hrs.** |
|---|---|---|
| **1.** | **D.C. circuits :( Only independent sources)** Voltage divider rule, current divider rule, power dissipation in resistance, Star delta transformation, Mesh and nodal analysis, source transformation. | **04** |
| **2.** | **D.C. Circuits Theorems:** Superposition, Thevenin's, Norton's and Maximum power transfer theorems. | **06** |
| **3.** | **A.C. Circuits:**. A.C. through resistance, inductance and capacitance, R-L, R-C, R-L-C series and parallel circuits, phasor diagrams, power and power factor. Problems by analytical as well as graphical methods. | **07** |
| **4.** | **Three Phase Circuits:** Three phase voltage and current generation, star and delta connections(Balanced load), Relationship between phase and line current and voltages, phasor diagrams, Measurement of power by two wattmeter method Problems by analytical as well as graphical methods. | **07** |
| **5.** | **Single Phase Transformer:** Construction, working principal, Emf equation, Ideal and practical transformer, phasor diagrams, Equivalent circuit, O.C. and S.C. test, efficiency and regulation, All day efficiency. | **05** |

| | | |
|---|---|---|
| **6.** | **Electrical Motors (No numerical expected):** D.C. Motors: construction, working principal, Characteristics, emf equation, A.C. Motors: Rotating magnetic field theory, 3-ϕ Induction Motor. Single phase induction motor: Construction, working principal, double field revolving theory, split phase and capacitor start motors. | **05** |
| **7.** | **Study of Meters:** Study of Tachometer, voltmeter, ammeter, multi-meter, wattmeter etc. | **02** |

**Text Books:-**

1) Mittle and Mittle (2005), 'Basic Electrical Engineering',Tata McGraw Hill.
2) B.L. Theraja-' A Text Book of Electrical Technology',Vol-1, S. chand & co. New-Delhi,1st Edition(re Print), ISBN-81-219-2440-5
3) V.K.Mehta –'Basic Electrical Engg.& electronics ',S. chand & co. New-Delhi,5th Edition, ISBN-81-219-0871-X, 903 pages.

**Reference Books:-**

1) Vincent Deltoro (1986), 'Electrical Engineering fundamentals', Pearson Education 2 nd Edition New Delhi, ISBN 0132471310, 896 Pages.
2) H. Cotton (2011),'Advanced Electrical Technology', Wheeler Publication, Alahabad, ISBN 8190630717, 1293 Pages
3) Joseph A. Edminster (1965), 'Electrical Circuits', TataMcGraw Hill, New Delhi, 4 th Edition, ISBN 0070189749

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T-1 | Module 1 and 2 |
| 2 | T-2 | Module 3 ,4and 5 |
| 3 | Final Examination | 1 To 7 |

| **SEMESTER-I** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT103** | **COURSE: Engineering Graphics-I** | | |
| **Prerequisites** | **Std. XII Mathematics, Std. XII Physics** | | |
| Period per week (each of 60 minutes) | Lecture | 03 | |
| | Laboratory | --- | |
| | Tutorial | 02 per batch | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | 01 | 20 X 02 |
| | End Semester* | 03 | 100 |
| | Practical | --- | --- |
| | Tutorial/Journal | --- | 25 |
| | **TOTAL** | | **125** |

* 60% Weightage for end semester

# Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

(i) Attendance in Laboratory/Tutorial = 20%,

(ii) Journal/Drawing sheet/Sketch book = 40%,

(iii) MCQ/Oral/Test = 40%.

**Course Objectives:**

1. To understand the fundamental principles of solid geometry, this is the base of engineering Graphics.
2. To understand the concepts of projections of an object and various ways of projection for visualization of various engineering parts and components.
3. To develop competence in correct expression of the visualized objects.
4. To develop competence in use of Autocad as an effective tool for Engineering Graphics.
5. To provide an insight of the technical drawing.

**Course Outcome:**

- Students will be able to draw & solve the problems on curves, lines, planes, solids, section of solids and development.
- Students will be able to identify the various geometries.
- Students will be able to differentiate line, planes, solids etc.
- Students will be able to interpret the intricacies of section of solid s & development of solids.

**Course Contents:**

| **Module No.** | **Details** | **Hrs.** |
|---|---|---|
| 1 | Engineering Curves:<br>Conics-Parabola, Ellipse, Hyperbola. Involutes, Cycloidal Curves: Cycloid, Epicycloid, Hypocycloid. Spirals, Helix. | 07 |
| 2 | Projection of points&lines inclined to both the reference planes. | 06 |

| | | |
|---|---|---|
| 3 | Traces of the Lines on the Reference Planes | 03 |
| 4 | Projection of Planes inclined to both the Reference Planes | 05 |
| 5 | Projection of Right regular Solids: Regular Polyhedrons (Tetrahedron), Prisms, Pyramids, Cylinders, Cones inclined to both the Reference Planes. | 07 |
| 6 | Sections of solids cut by inclined planes. | 07 |
| 7 | Development of Lateral surfaces of solids cut by inclined plane and curved plane | 07 |

**Termwork:**
Term work shall comprise of total five A2 size drawing sheets consisting of 2 to 3 problems on each module and class assignments. The class assignments and each drawing sheet shall have equal weightage in termwork marks.

**Text Books:-**

1. N.D.Bhatt (2011), 'Elementary Engineering Drawing', Charotar Publishing House, ISBN 9380358172, 728 Pages
2. T.Jeyapovan (2010), 'Engineering Drawing and Graphics, Vikas Publishing House Pvt. Ltd. 3rd Edition, ISBN 8125940006, 712 Pages
3. K.L.Narayana&P.Kannaiah (1988), 'Engineering Graphics', Tata McGraw-Hill Co .Ltd., New Delhi, ISBN 0074517902, 544 Pages

**Reference Books:-**

1. K.Venugopal (2007), 'Engineering Drawing and Graphics', New Age International Publishers, ISBN 8122415458, 410 Pages
2. Giesecke, Mitchell, Spencer &Hill (2011), 'Technical Drawing', Macmillan Publishing Co. Inc.14th Edition, ISBN 0135090490, 936 Pages
3. Warren H .Luzadder (1976) , 'Fundamentals of Engineering Drawing', Prentice Hall of India Pvt.Ltd., New Delhi 7th Edition, ISBN 0133383687, 620 Pages
4. M.B.Shah&B.C.Rana (2009), 'Engineering Drawing', Pearson Education 2nd Edition, ISBN 8131710564, 580 Pages
5. M.L.Dabhade (2004), 'Engineering Graphics', Association of Technical Authors, ISBN 8187575751, 772 Pages

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T-1 | Module 1 and 2 |
| 2 | T-2 | Module 3 and 4 |
| 3 | Final Examination | Module 1 to 7 |

| **SEMESTER-I** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT104** | **COURSE: Engineering Mechanics-I** | | |
| **Prerequisites** | **Std. XII Physics** | | |
| Period per week (each of 60 minutes) | Lecture | 03 | |
| | Laboratory | --- | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | 01 | 20 X 02 |
| | End Semester* | 03 | 100 |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | --- |
| | **TOTAL** | | **100** |

* 60% Weightage for end semester

**Course Objectives:**

The main objectives of the course are

- To introduce the students to the principles and methods of statics (mechanics), and to apply those fundamentals to solve the problems on statics.
- To prepare the base for the students to study other engineering/structural engineering courses such as Mechanics-II, Strength of Materials, Structural Analysis-I etc. at a later stage.

**Course Outcomes:**

At the end of the course the students shall be able to

1. determine the resultant of coplanar and non co planar system of forces.
2. solve the problems involving equilibrium of coplanar and non co planar system of forces.
3. analyse determinate beams using the principle of virtual work.

**Course Contents:**

| **Module No.** | **Details** | **Hrs.** |
|---|---|---|
| 1 | **System of Coplanar forces:** Introduction to coplanar & non-coplanar force system.Forces and their components. Moment of the force about a point, couple. | 02 |
| 2 | Resultant of coplanar force system - concurrent forces, parallel forces, non-concurrent non-parallel system of forces.Varignon's theorem. | 06 |
| 3 | **Equilibrium of coplanar force system:** Meaning of equilibrium, free body diagrams, equilibrium of concurrent, parallel and non-concurrent non-parallel (general) system of forces. Types of supports, determination of reactions at supports for various types of determinate beams. | 06 |
| 4 | **Forces in space:** Rectangular components of forces in space, Resultant of concurrent forces, moment of a force about a point, moment of a force about a given axis, resultant of general force system, Equilibrium of a particle in space. | 06 |
| 5 | **Analysis of pin jointed frame / truss:** Perfect truss, Imperfect truss, Analysis of truss by method of joints and method of section. | 06 |

| | | |
|---|---|---|
| 6 | **Friction:**<br>Laws of friction, angle of friction, angle of repose, cone of friction, Equilibrium of bodies on rough horizontal and inclined plane, application to problems involving wedges, ladder. Belt friction, flat belts on the flat pulleys. | 06 |
| 7 | **Principle of virtual work:**<br>Application to determine the reactions of determinate beams with / without internal hinges. | 04 |

**Reference Books:-**

1. B. N. Thadani(1966); "Engineering Mechanics", Asia Publishing House, ISBN 0210269405, 655 pages
2. Beer & Johnson (2013), "Engineering Mechanics", Tata McGraw Hill, ISBN 1259062919, 470 pages
3. F. L. Singer (1975), "Engineering Mechanics", Harper & Raw Publication, ISBN 0060462329, 724 pages
4. A. Nelson (2009), "Engineering Mechanics", Tata McGraw Hill, ISBN 0070146143
5. Shames (2006), 'Engineering Mechanics', Prentice Hall, India, ISBN 8177581236, 837 pages

**Text Books:-**

1. R. C. Hibbeler (2007); "Engineering Mechanics", Pearson Education Inc., ISBN 0132215098, 656 pages
2. A. K. Tayal (2010), 'Engineering Mechanics', Umesh Publication, ISBN 9380117388
3. Kumar(1956), "Engineering Mechanics", Tata McGraw Hill, ISBN 0070681813, 673 pages.

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T – I | Module 1, 2 and part of Module 3 |
| 2 | T – II | Part of Module 3, Module 4 and part of Module 5 |
| 3 | Final exam | Module 1 to7 |

| **SEMESTER-I** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT105** | **COURSE: Applied Physics –I** | | |
| **Prerequisites** | **Std. XII Physics** | | |
| Period per week (each of 60 minutes) | Lecture | 02 | |
| | Laboratory | --- | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | 01 | 20 X 02 |
| | End Semester* | 03 | 75 |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | -- |
| | **TOTAL** | **---** | **85** |

*60% Weightage for end semester

**APPLIED PHYSICS – I**

**Rationale:**

A strong applied sciences programme, that creates a bridge between the sciences and engineering, for first-year students, is a prerequisite for a good engineering programme. This syllabus primarily focuses on the concepts needed for first year engineering students for their further technological studies.

**Course Objectives (General)**

1. To extend students' knowledge of Physics in the areas of Engineering.
2. To develop general analytical capabilities those are important and relevant in their higher semesters.
3. To setup theory related laboratory experiments so as to apply his/her theoretical knowledge to a practical situation

**Course Objectives:**

1. To explain and interpretbasic properties involved in thin film interference, diffraction, optical fibers and lasers.
1. To introduce students to Quantum mechanics basic concepts and introduce Schrodinger's equations and their applications.

**Course Outcomes:**

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

1. Analyse the thin film intereference pattern, Fraunhofer diffraction, working principles and application of lasers and optical fibers.
1. Learn basic differences between Newtonian mechanics and Quantum mechanics, wave-particle duality, Heisenberg's uncertainity principle and Schrodinger's equations and applications of these equations.

**Course Contents:**

| **Module No.** | **Details** | **Hrs.** |
|---|---|---|
| 1 | **Interference**:<br>Interference in thin films- equal thickness and wedge shaped films, | 6 |

| | | |
|---|---|---|
| | Newton's rings. Applications. | |
| 2 | **Diffraction:**<br>Types of diffraction, Fraunhofer diffraction through a single slit and diffraction grating, grating spectra, resolving power of a grating. | 6 |
| 3 | **Fiber optics and Fiber optic communication:**<br>Optical fiber: Propagation of light in an optical fiber- TIR, Angle of Acceptance; Numerical Aperture; Types of Fibers; Advantages of Optical Fiber, Applications. | 6 |
| 4 | **LASERs:**<br>Absorption, spontaneous and stimulated emission, Einstein's coefficients. Terms Associated with Lasers: population inversion, metastable state, pumping and pumping schemes, active medium, and resonant cavity. Ruby laser, He-Ne Laser, semiconductor diode laser. Applications: Holography. | 6 |
| 5 | **Quantum Mechanics:**<br>Introduction, Wave particle duality, de Broglie wavelength; experimental verification of de Broglie theory; properties of matter waves; wave packet, group velocity and phase velocity; Wave function, Physical interpretation of wave function;Heisenberg's uncertainty principle; Electron diffraction experiment and Gama ray microscope experiment; Applications of uncertainty principle; Schrodinger's time dependent wave equation, time independent wave equation, Motion of free particle, Particle trapped in one dimensional infinite potential well. | 8 |

**Reference Books:-**

1. Halliday and Resnick (2013), 'Fundamentals of Physics',Wiley Eastern Limited, 10th Edition, ISBN 1118230647, 1232 Pages
2. Jenkins & White (2001), 'Fundamentals of optics', McGraw-Hill Int., 4th Edition, ISBN0072561912, 768 Pages
3. Arthur Beiser (2009), 'Concepts of Modern Physics',TataMcGraw Hill, 6th Edition, ISBN 0070151555
4. K. Thyagarajan and AjoyGhatak (2010), 'Lasers theories and application',Springer, 2nd Edition, ISBN 1441964410, 650 Pages
5. AjoyGhatak and K Thayagarajan (2006), 'Fiber Optics and LASERs the two revolutions', McMillan India, ISBN 1403930112, 248 Pages

**Text Books:-**

1. Kshirsagar and Avadhanulu (1992), 'A textbook of Engineering Physics', S. Chand Publications, ISBN 8121908175, 758 Pages.
2. A.S. Vasudeva (2008), 'Modern Engineering Physics', S. Chand Publications, ISBN 8121917573, 383 Pages.
3. Hitendra K. Malik and AK Singh (2013), 'Engineering Physics', Mc Graw Hill Publications ISBN 0070671532.
4. G Vijayakumari (2006), 'Engineering Physics', Vikas Publishing House, ISBN 9788125924098, 425 pages.

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T-1 | Module 1and 2 |
| 2 | T-2 | Module 3 and 4 |
| 3 | Final Examination | Module 1 to 5 |
| | | |

| **SEMESTER-I** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT106** | **COURSE: Applied Chemistry –I** | | |
| **Prerequisites** | **Std. XII Chemistry** | | |
| Period per week (each of 60 minutes) | Lecture | 02 | |
| | Laboratory | --- | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | 01 | 20 X 02 |
| | End Semester* | 03 | 75 |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | --- |
| | **TOTAL** | **---** | **85** |

*60% Weightage for end semester

## APPLIED CHEMISTRY – I

**Course Objectives:**

The main objective of the course are

1. To introduce the students to basic knowledge of chemistry of water, lubricant, polymer and steel.
2. To introduce the student to theory, principles and mechanism of chemical processes.
3. To introduce the application of chemistry in engineering and technology.

**Course Outcomes:**

After successful completion of this course, the student will able to :

1. Analyse water quality.
2. Determine chemical behavior of different types of lubricant.
3. Find out characteristic properties of polymer.
4. Explore use of nano material and its application.

**Course Content:-**

| **Module No.** | **Details** | **Hrs.** |
|---|---|---|
| 1. | **Water:**<br>Hardness of water, types of hardness, units of Hardness, determination of hardness by EDTA method and numerical problems.<br>Internal treatment of hard water.<br>External Treatment of hard water by<br>i) lime soda method with equations in general & Numerical problems.<br>ii) Zeolite or permutit process & numerical problems.<br>iii) Ion exchange method. | 06 |
| 2 | **Water:** Desalination of BRACKISH WATER - Reverse osmosis<br>Ultra filtration and it's industrial applications.<br>Methods to determine extent of water pollution i) BOD. ii) COD<br>Chemical Analysis of water with special reference to Total Dissolved Salts-TDSMethods to control water pollution – activated sludge process for sewage treatment, flow sheet diagram for sewage treatment. | 04 |
| 3 | **Lubricants:** | 04 |

| | | |
|---|---|---|
| | Definition, classification, functions, characteristic properties of an ideal lubricant with special reference to flash point, fire point, cloud point, pour point, Acid Value, saponification value and numerical problems on acid value & saponification value | |
| 4 | **Steels**<br>Plain Carbon Steel-Limitations<br>Introduction to Alloy Steels, Special Steels | 04 |
| 5 | **Polymers**<br>Conducting-polymers, electrical properties & liquid crystal properties of Polymers. | 04 |
| 6 | **Energy:**<br>Classification of sources of energy-Renewable(Non-Conventional) &Non-Renewable Or(Conventional) Energy Sources, Biomass Energy, Solar Energy-production of electricity using solar energy with schematic diagrams.<br>Hydrogen as a fuel, fuel cells. Rechargeable alkaline storage Batteries-Nickel Hydrogen Batteries, Rechargeable Lithium ion Batteries (Diagram, charging, discharging reactions, advantage & applications). | 06 |
| 7 | **Nano –Materials:**<br>Graphite, Fullerenes, Carbon Nanotubes, Nanowires, Nanocones Haeckelites-srtucture & their electronic and mechanical properties<br>Applications of Nanomaterials in – i) Medicine ii) Catalysis iii) Environmental Technologies iv) Electronics & related fields v) Mechanics | 04 |

**Reference Books:-**

1. P.C.Jain& Monica Jain (2004), 'Engineering Chemistry', DhanpatRai publishing company Pvt. Ltd, 15th Edition, ISBN 8187433175, 1288 Pages
2. Emil Roduner (2006), 'Nano Scopic Materials', RSC Publishing, ISBN 0854048571, 285 Pages
3. VasantGowarikar (1986), 'Polymer science', New Age International Pvt Ltd, ISBN 0852263074, 505 Pages
4. Cotlon (1994), 'Basic Inorganic Chemistry', Wiley India, 3rd Edition, ISBN 0471505323, 856 Pages

**Text Books:-**

1. S. S. Dara&Dara (1986), 'Engineering Chemistry', S. Chand & Company Ltd, 12th Edition, ISBN 8121903599, 992 Pages
2. O.P. Khanna (2010), 'Material Science for engineering students', DhanpatRai, Publications (p) Ltd., ISBN 8189928317, 1179 Pages

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T-1 | Module 1 and 2 |
| 2 | T-2 | Module 3 ,4and 5 |
| 3 | Final Examination | All Module |

| **SEMESTER-I** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: FY107** | **COURSE: Communication Skills** | | |
| **Prerequisites** | **Std. XII English** | | |
| Period per week (each of 60 minutes) | Lecture | 02 | |
| | Laboratory | --- | |
| | Tutorial | 02 per batch | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | 01 | 20 X 02 |
| | End Semester* | 03 | 100 |
| | TW/Practical/Oral/MCQ's | --- | 50 |
| | **TOTAL** | | **150** |

*60% Weightage for end semester

**Course Objectives:**

1. To create an understanding of the basics communication through Engliish, application for the various models of Verbal and Non-Verbal communication in the Social and Professional sphere.
2. To identify the basics of grammar so as to help, improve communication and speak a neutral and correct form of English. The focus is to assist the students entering the technical field to acquire proficiency in Business English.
3. To acquire strategic competence to use spoken and written language in a wide range of communication strategies and respond appropriately in different socio-cultural and professional contexts.
4. To increase students' ability to improve and utilize the skills necessary to be a competent interpersonal communicator, increase the students understanding of his or her own communication behavior and that of others.

**Course Outcomes:**

Learners will able to:

1. Acquire knowledge about the various principles of communication, understand its various stages and the role of audience and purpose, deal with the barriers that affect communication in a professional setup.
2. Explain the different channels that are functional at the workplace so as to be able to execute their work behavior in an organization and familiarize them with business writings of Business Organisations.
3. Learn the importance of Verbal and non-verbal communication in the professional world along with its uses.
4. Imbibe the knowledge of effective public speaking skills and soft skills to demonstrate their understanding of being effective communicators in a professional and social set up.
5. Learn the nuances of effective reading , writing, speaking and listening skills using effective communication.

**Course Content:-**

| Module No. | Details | Hrs. |
|---|---|---|
| 01 | **Building Advanced Vocabulary:**<br>Synonyms and Antonyms, One-word substitutes, Words often Confused. Homophones and Homonyms. | 02 |
| 02 | **Communication theory:**<br>Meaning, Definitions, Components, Objectives, Importance of communication in a business organization. Barriers to communication, Methods of communication: Verbal and Non-Verbal | 08 |
| 03 | **Communication in a Business Organization:**<br>(Internal, External, Upward, Downward, Horizontal, Grapevine), Problems and Solutions. | 03 |
| 04 | **Comprehension and Summarization:**<br>Techniques to comprehend and summarize a given technical, scientific or industry oriented text. Questions to test analytical skills and expressions. | 02 |
| 05 | **Techniques to improve communication:**<br>5.1. Reading Skills – Barriers to reading and techniques to improve reading.<br>5.2. Speaking Skills - Voice Modulation, Good Pronunciation,-Speaking without Fear, -Extempore & Prepared Speaking, role play in different situations. How to present effective speeches through Talk power program.<br>5.3. Listening Skills - Barriers to Listening, Listening & Note Making.<br>5.4. Writing Skills – Barriers and techniques to improve writing skills.<br>5.5. Technical Writing: Description of an object, Explanation of a process, Giving instructions. | 06 |
| 06 | **Business Correspondence:**<br>Principles of correspondence, Language, Style, Types of formats-3, Types of letters: Enquiry and Reply, Complaint and Adjustments. | 06 |
| 07. | **Soft Skills:**<br>Developing positive attitude, Forming Values and Ethics, Time Management. | 05 |

**List of Assignments:**

1. 2 assignments on vocabulary topics
2. 3 assignments on techniques to improve communication
3. 2 Practical session throughpublic speaking, speeches and presentation
4. 3 assignments on Communication Theory
5. 2 assignments on Business Correspondence
6. Group activity and role play
7. Case studies on soft skills and documentation in the form of assignments

**Text Books:-**

1. Meenakshi Raman and Dr. Sangeeta Sharma, 'Communication Skills', Oxford University Press.

**Reference Books:-**

1. Sharma R.C. and Krishna Mohan, 'Business Correspondence and Report Writing', Tata McGraw Hill Publications 3rd Edition.
2. Meenakshi Raman and Prakash Singh (2006), 'Business Communication', Oxford University Press.
3. Adler Ronald B. and Rooman George, "Understanding Human Communicaion", Oxford University Press, 9th edition.
4. Rai Urmila, Rai S.M., 'Business Communication', Himalaya Publishing house.
5. Sinha K.K., 'Business Communication'.
6. Locker, Kitty O. and Stephen Kyo Kaczmarek, 'Business Communication: Building Critical Skills', McGraw Hill.

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T – I | Module 1 & 2 |
| 2 | T – II | Module 3 & 4 |
| 3 | Final exam | Module 2,3,4,5 |

| **SEMESTER-I** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT152** | **COURSE: Basic Electrical and Electronics I** | | |
| **Prerequisites** | **Std. XII Physics, BT102** | | |
| Period per week (each of 60 minutes) | Lecture | - | |
| | Laboratory | 02 per batch | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | | |
| | End Semester* | | |
| | Practical | | |
| | Laboratory Work (Journal) | 02 | 25 |
| | **TOTAL** | **---** | **25** |

# Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

(i) Attendance in Laboratory/Tutorial = 20%,
(ii) Journal/Drawing sheet/Sketch book = 40%,
(iii) MCQ/Oral/Test = 40%.

**Course Objective:**

1. To impart knowledge on solving electrical circuits using network theorems practically.
2. Todraw phasor diagrams and make analysis of AC circuits.
3. To perform simple Experiments like oc and sc test,load test on single phase transformers.
4. To Peform experiments on two wattmeter method.
5. Introduction to motors and meters.

**Course Outocmes:**

The students will have

1. Ability to analyse electrical circuits
2. Ability to apply circuit theorems
3. Aware of electrical machines and meters

**List of Experiments:**

**Demonstration Experiments:**

1. Study of meters (Tachometer, voltmeter, ammeter, multi-meter, wattmeter etc.)
2. Use of two wattmeter method to measure Power in a three phase system.
3. Study Load Characteristic of D. C. Shunt Motor.

**Experiments to be performed:**

1. To analyze Mesh and Nodal circuits.
2. To verify Superposition Theorem to given circuit.
3. To verify Thevenin's & Norton's Theorems to given circuit.

4. To plot Graph between Power & Load using Maximum power transfer theorem.
5. To Determine Inductance & Internal Resistance of R-L circuits.
6. To Determine Capacitance of R-C circuits.
7. To plot Curves for Efficiency & Regulation by direct Loading of single phase transformer.
8. To carry out O.C. and S.C. test on a single phase transformer.

**Note**: Practical examination will be as follows:
Attendance 20%, Practical performed during semester and graded Journals 40%,
Practical/Mini Project 40%

| **SEMESTER-I** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT154** | **COURSE: Engineering Mechanics-I** | | |
| **Prerequisites** | **Std. XII Physics, BT104** | | |
| Period per week (each of 60 minutes) | Lecture | - | |
| | Laboratory | 02 per batch | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | - | - |
| | End Semester* | - | - |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | ---02----- | 25 |
| | **TOTAL** | | **25** |

**Course Objectives:**

The main objectives of the course are

- To introduce the students to the experimental methods to verify the principles and methods of statics (mechanics).

**Course Outcomes:**

At the end of the course the students shall be able to

1. Experimentally verify the principles of statics (mechanics).

**# Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:**

(i) Attendance in Laboratory/Tutorial = 20%,
(ii) Journal/Drawing sheet/Sketch book = 40%,
(iii) MCQ/Oral/Test = 40%.

**List of Experiments:**

1. To find reactions of simply supported beam (Parallel force system)
2. To verify polygon law of forces (Concurrent force system)
3. To verify Lami's theorem using simple jib crane
4. Equilibrium of non-concurrent non parallel force system
5. To verify moment equilibrium condition using bell crank lever
6. To determine coefficient of friction using friction plane
7. To determine coefficient of friction using angle of repose method

| **SEMESTER-I** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT155** | **COURSE: Applied Physics –I** | | |
| **Prerequisites** | **Std. XII Physics, BT105** | | |
| Period per week (each of 60 minutes) | Lecture | - | |
| | Laboratory | 02* per batch | |
| | Tutorial | --- | |
| Schem of Evaluation | | Hours | Marks |
| | In Semester | - | - |
| | End Semester* | - | - |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | 15 |
| | **TOTAL** | **---** | **15** |

*** Alternate weeks.**

**Laboratory objectives (General)**

- To setup state of the art physics laboratory so as to master basic physics concepts
- To help the students develop a broad array of basic skills and tools of experimental physics.
- To help students develop collaborative learning skills that are vital to success in the field of engineering.

**Laboratory Objectives:**

1. To setup theory related laboratory experiments on optics and Lasers so as to apply his/her theoretical knowledge to a practical situation.

**Laboratory Outcomes:**

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

1. Explain the applications of thin film interference using Wedge shaped films experiment and Newton's Rings.
2. Explore the visible spectrum using a diffraction spectrometer and find the wavelength range.
3. Understand the use of Lasers and Optical fibers in the field of Physics and Engineering**.**

# Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

- (i) Attendance in Laboratory/Tutorial = 20%,
- (ii) Journal/Drawing sheet/Sketch book = 40%,
- (iii) MCQ/Oral/Test = 40%.

**List of Experiments: (Minimum 5 to be performed)**

1. Wedge shaped films: to find the wedge angle and thickness of paper.
2. Newton's rings: to find radius of curvature of given lens.
3. Spectrometer: to find wavelength of mercury spectrum/grating element using diffraction grating.

4. Ultrasonic interferometer: to find velocity of sound in a given liquid.
5. Ultrasonic distance meter: to find carpet area and volume of the room using ultrasonic distance meter.
6. He-Ne laser: to find grating element of diffraction grating/wavelength of He-Ne laser.
7. Optical fiber: to find numerical aperture of optical fiber/ Fiber optic communication

| **SEMESTER-I** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT156** | **COURSE: Applied Chemistry –I** | | |
| **Prerequisites** | **Std. XII Chemistry, BT106** | | |
| Period per week (each of 60 minutes) | Lecture | --- | |
| | Laboratory | 02 per batch | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | --- | --- |
| | End Semester* | --- | --- |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | 15 |
| | **TOTAL** | **---** | **15** |

# Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

(i) Attendance in Laboratory/Tutorial = 20%,
(ii) Journal/Drawing sheet/Sketch book = 40%,
(iii) MCQ/Oral/Test = 40%.

**Course Objectives:**

The main objective of the course are

1. To introduce the students to basic knowledge of material chemistry.
2. To correlate theory with experiment.
3. Application of chemistry in engineering and technology.

**Course Outcomes:**

After successful completion of this course, the student will able to :

1. Carry out water analysis.
2. Analyse properties of oil.
3. Prepare nano materials.

**LIST OF EXPERIMENTS-(Minimum 5 to be performed)**

1. To Determine Total,Temporary&Permanent hardness of water sample.
2. Removal of hardness of water by Ion-Exchange Column.
3. To Determine COD of an effluent sample.
4. CO2 from air by Orsat's method.
5. To Determine Acid-Value of the given Lubricating Oil.
6. To Determine Saponification-Value of the given Lubricating Oil.
7. To Determine Flash-Point/Fire-Point of lubricating oil
8. To determine the conductance of the polymer.
9. To Determine Melting Point/Glass Transition Temperature of a polymer.
10. To prepare Nano-Oxide using combustion method.

| **SEMESTER-I** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT199** | **COURSE: Workshop - I** | | |
| **Prerequisites** | **Basic knowledge of carpentary, smithy, fitting and welding** | | |
| Period per week (each of 60 minutes) | Lecture | --- | |
| | Laboratory | 03 per batch | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | --- | --- |
| | End Semester | --- | --- |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | 50 |
| | **TOTAL** | | **50** |

*60% Weightage for end semester

**Rationale:**

Workshop forms not an indispensible part of any industry. An engineer working in field must have thorough knowledge of various tools, machines, devices used in engineering practice for creating objects from material. The students of engineering discipline must be conversant with the various operations performed on materials for producing desired shapes with comprehensive knowledge of working principles of machine tools, use of tools and devices with their effective use and application. Basic Workshop Practice is a practical course which emphasizes on laying basic foundation for an engineering student.

**Course Objectives:**

1. To impart knowledge to students to develop their technical skill sets for creating entities from raw material.
2. To give “hands on” training and practice to students for use of various tools, devices, machines.
3. To develop ability of students to understand, plan and implement various processes and operations to be performed on the raw material to create object of desired shape and size.
4. To give exposure to inter disciplinary domains.

**Course Outcome:**

1. Thorough knowledge of various tools, machines, devices used in engineering practice for creating objects from material.
2. Thorough knowledge of carrying out various operations in basic engineering shops
3. Ability of interpretation of job drawing, application of processes and operations to produce basic components from raw material.

# Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

(i) Attendance in Laboratory/Tutorial = 20%,
(ii) Journal/Drawing sheet/Sketch book = 40%,
(iii) MCQ/Oral/Test = 40%

**Course Content:**

| Module No. | Details | Hrs. |
|---|---|---|
| 01 | Fitting (Compulsory):-<br>• Use and settings of fitting hand tools for marking, chipping, cutting, filing, centre punching, hammering, drilling, tapping.<br>• Term work to include one job:- Male –female joint involving above operations. | 12 |
| 02 | Carpentry (Compulsory):-<br>• Use and setting of carpentry hand tools like hacksaws, jackplanes, chisels and gauges for construction of various joints. Term work to include one job involving a use of tools and operations:- Half Check joint. | 12 |
| 03 | Carpentary (Demonstartion):-<br>• Wood turning Demonstration. | 03 |
| 04 | Forging / Smithy (Demonstration):-<br>• One job: - Lifting Hook and Handle to be demonstrated by instructor to a batch. | 04 |
| 05 | Welding ( Demonstration):-<br>• Edge preparation for welding jobs, arc welding, different types of joints such as Lap Welding, Butt Welding etc.<br>• One job each involving Lap welding and Butt welding of two plates to be demonstrated by instructor to a batch. | 04 |
| 06 | Machine Shop (Demonstration):-<br>1. One turning job to be demonstrated by instructor to a batch. | 04 |
| 07 | Electrical Board Wiring (Demonstration):-<br>2. House wiring, staircase wiring for fluorescent tube light, go-down wiring and three phase wiring for electrical motors. | 03 |

**Termwork:**

Every student has to perform one job from one compulsory trade and attend demonstration in two trades in each of semester I and II. Term work shall comprise of 01 compulsory job and demonstration jobs (any two) performed in the semester.

The syllabus of Basic Workshop Practice and term work to be done in Semester –I & II are given together. The jobs for practice and demonstration are designed with the work of the course spread over two semesters. In each semester every student has to perform a job in one compulsory trade and attend demonstrations in other two trades

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T-1 | Module 1 and 2 |
| 2 | T-2 | Module 3 and 4 |
| 3 | Final Examination | Module 1 to 7 |

# FIRST YEAR B.Tech.

## (CIVIL /MECHANICAL /ELECTRICAL)

## Sem. II

## ACADEMIC SCHEME AND SYLLABUS

## Year 2015-16

| **SEMESTER-II** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT201** | **COURSE: Engineering Mathematics -II** | | |
| **Prerequisites** | **Std. XII Maths, BT101** | | |
| Period per week (each of 60 minutes) | Lecture | 04 | |
| | Practical | --- | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | 01 | 20 X 02 |
| | End Semester* | 03 | 100 |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | --- |
| | **TOTAL** | **---** | **100** |

* 60% Weightage for end semester

**Course Objectives:**

1. Introduce Curve tracing, how to rectify a curve, learn double integrals and its application to find area and mass of lamina, learn triple integral and its application to find volume of a solid.
2. Introduce and learn how to solve 1st order ordinary differential equation and its applications to solve engineering problems.
3. Introduce and learn how to solve higher order linear differential equations with constant coefficients and its application to engineering problems.
4. Introduce beta and gamma functions.

**Course Outcomes:**

Upon successful completion of the course, students should be able to

1. Change double integral from Cartesian to Polar co-ordinate system, Find area and mass of lamina.
2. Solve Triple integrals and find volume of three dimensional solids.
3. Use beta, gamma functions and DUIS Rule to solve improper integrals.

**Course Contents:**

| **Module No.** | **Details** | **Hrs.** |
|---|---|---|
| 1 | **Integral Calculus:**<br>1.1 Curve tracing in Cartesian and Polar Coordinates.<br>1.2 Rectification of plane curves. | 4 |
| 2 | 2.1 Double Integral, Change of order of double integral. Evaluation by changing to polar form.<br>2.2 Applications to find area and mass of lamina. | 10 |
| 3 | 3.1 Triple Integral, Evaluation using Cartesian, Cylindrical and Spherical polar coordinates. | 6 |

| | | |
|---|---|---|
| | 3.2 Applications to find volume. | |
| 4 | **First Order and First Degree Ordinary Differential Equations**<br>4.1 Exact differential equations, Differential Equations which are reducible to the exact form by using integrating factors.<br>4.2 First order linear differential equations and differential equations reducible to the linear form | 8 |
| 5 | **Higher Order Linear Differential Equations**<br>5.1 Higher Order Linear differential equations with constant coefficients – Complimentary functions, particular integrals of differential equations of the type $F(D)y = Q(x)$. Method of variation of parameters<br>5.2 Cauchy's homogenous linear differential equation and Legendre's differential equation.<br>5.3 Simple application of differential equations of first and second order to engineering problems | 10 |
| 6 | **Gamma and Beta Functions**<br>6.1 Gamma function, reduction formula.<br>6.2 Beta function. Duplication formula (with proof), Relation between Gamma and Beta function (without proof) and examples | 7 |
| 7 | 7.1 Differentiation Under the Integral Sign | 3 |

**Text Books:-**

1. Vinod Sharma (2013), "Applied Mathematics – II" Tech-max Publications, First edition, ISBN 9789350771976
2. G.V. Kumbhojkar and C. Jamanadas "Applied Mathematics - II" first edition.

**Reference Books**:-

1. Erwin Kreyszig (2010), "Advanced Engineering Mathematics" Wiley Eastern Limited, Singapore 10th edition, ISBN 0470458365,1280 Pages
2. Shanti Narayan (2005), "Differential Calculus", S.Chand Publications,30th Edition,ISBN 8121904714, 572 Pages
3. B S Grewal (2013), "Higher Engineering Mathematics", Khanna Publications, 43rd Edition, ISBN 8174091955, 1312 Pages

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T-1 | Module 1 & 2 |
| 2 | T-2 | Module 3 & 4 |
| 3 | End Semester Examination | Module 1 to 7 |

| **SEMESTER-II** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT202** | **COURSE: Basic Electrical and Electronics II** | | |
| **Prerequisites** | **Std. XII Physics, BT102** | | |
| Period per week (each of 60 minutes) | Lecture | 03 | |
| | Laboratory | --- | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | 01 | 20*2 |
| | End Semester* | 03 | 100 |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | --- |
| | **TOTAL** | **---** | **100** |

*60% Weightage for end semester

**Course Objectives:**

1. To create awareness amongst students regarding electronic devices, circuits and systems used in industry, and laboratories.
2. To understand applications of Electronics devices.

**Course Outcomes:**

Students will be able-

1. To understand the working of Various Electronics devices.
2. To Analyze & make use of Electronics devices in day to day work

**Course Contents:**

| Module No | Details | Hrs. |
|---|---|---|
| **1.** | **Diode :** LED, Photodiode, Zener and avalanche breakdown , | **02** |
| **2.** | **Diode Applications:** Half wave, Full wave, Bridge Rectifiers, Specifications of the devices required for C, LC, and CLC filter, Zener as a regulator. | **08** |
| **3.** | **Bipolar Junction (BJT):** BJT configurations such as CE, CC, CB, Characteristics, BJT as a switch, BJT as an amplifier. | **07** |
| **4.** | **Field Effect Transistors FET:** JFET construction, characteristics (CS), FET as an amplifier. | **06** |
| **5.** | **Silicon Controlled Rectifier:** Principle of operation of SCR, SCR Characteristics. | **03** |
| **6.** | **Digital Electronics Fundamentals:** Difference between analog & digital signals, Basic & Universal Gates, Symbols, Boolean algebra, Truth tables, Expressions, Logic simplification. | **05** |
| **7.** | **Op amp:** Op amp as a basic block. Op amp as a inverting and on inverting Amplifier. Applications like adder, subtractor, voltage follower, etc. | **05** |

**Text Books:-**

1) B.L. Theraja- 'A Text Book of Electrical Technology', Vol-IV (EDC), S. chand & co. New-Delhi,23rd Edition(re Print), ISBN-91-219-2667-X, 2736 pages.
2 Jain R.P. (2003), 'Modern Digital Electronics', Tata McGraw Hill, ISBN0070494924, 611 Pages

3) Bhargava, Kulshreshtha, Gupta (1984), 'Basic Electronics and Linear Circuits', TTTIChandigarh, TMH, ISBN 0074519654, 490 Pages

**Reference Books:-**

1. Robert Boylestad and Louis Nashelsky (2009), 'Electronic devices and circuits', Prentice Hall of India 10th Edition, ISBN 0135026490, 894 Pages
2. Mottershed Allen (1973), 'Electronic Devices and Circuits an Introduction', Prentice Hall ofIndia, 1st Edition, ISBN 8120301245, 656 Pages

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T – I | Module 1 & 2 |
| 2 | T – II | Module 3 & 4 |
| 3 | End Semester | Module 1 To7 |

| **SEMESTER-II** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT203** | **COURSE: Engineering Graphics-II** | | |
| **Prerequisites** | **BT103** | | |
| Period per week (each of 60 minutes) | Lecture | 03 | |
| | Practical | --- | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | 01 | 20 X 02 |
| | End Semester* | 03 | 100 |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | --- |
| | **TOTAL** | | **100** |

* 60% Weightage for end semester

**Course Objectives:**

1. The course aims at understanding the tools and techniques of AutoCAD package and appreciate AutoCAD as a powerful tool for creation of fast & error free drawings
2. To understand the concepts of projections of an object and various ways of projection for visualization of various engineering parts and components.
3. To develop competence in correct expression of the visualized objects.
4. To provide an insight of the technical drawing.

**Course Outcome:**

- Students will be able to draw & convert Orthographic views from pictorial views
- Students will be able to draw & convert isometric views from orthographic views
- Students will understand & interpret the given orthographic views to draw the Missing view.
- Students will able to practice the drawing of orthographic, isometric, missing views & machine parts like nuts, bolt, screws etc views using AUTOCAD software.

**Course Contents:**

| **Module No.** | **Details** | **Hrs.** |
|---|---|---|
| 1 | Introduction to Auto CAD package | 2 |
| 2 | Orthographic Projections | 2 |
| 3 | Sectional views of Orthographic Projections | 2 |
| 4 | Isometric Projections using Natural Scale, four center method, method of points, typical practical problems | 2 |
| 5 | Isometric Projections using Isometric Scale | 2 |
| 6 | Missing views | 2 |

| | | |
|---|---|---|
| 7 | Introduction to M/C Parts: Types of nuts, bolts, screws, studs and riveted joints | 1 |

**Text Books:-**

1. N.D.Bhatt (2011), 'Elementary Engineering Drawing', Charotar Publishing House, ISBN 9380358172, 728 Pages
2. T.Jeyapovan (2010), 'Engineering Drawing and Graphics, Vikas Publishing House Pvt. Ltd. 3rd Edition, ISBN 8125940006, 712 Pages
3. K.L.Narayana&P.Kannaiah (1988), 'Engineering Graphics', Tata McGraw-Hill Co .Ltd., New Delhi, ISBN 0074517902, 544 Pages

**Reference Books:-**

1. K.Venugopal (2007), 'Engineering Drawing and Graphics', New Age International Publishers, ISBN 8122415458, 410 Pages
2. Giesecke, Mitchell, Spencer &Hill (2011), 'Technical Drawing', Macmillan Publishing Co. Inc.14th Edition, ISBN 0135090490, 936 Pages
3. Warren H .Luzadder (1976) , 'Fundamentals of Engineering Drawing', Prentice Hall of India Pvt.Ltd., New Delhi 7th Edition, ISBN 0133383687, 620 Pages
4. M.B.Shah&B.C.Rana (2009), 'Engineering Drawing', Pearson Education 2nd Edition, ISBN 8131710564, 580 Pages
5. M.L.Dabhade (2004), 'Engineering Graphics', Association of Technical Authors, ISBN 8187575751, 772 Pages

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T-1 | Module 1 and 2 |
| 2 | T-2 | Module 3 and 4 |
| 3 | Final Examination | Module 1 to 7 |

| **SEMESTER-II** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT204** | **COURSE: Engineering Mechanics-II** | | |
| **Prerequisites** | **Std. XII Physics, BT104** | | |
| Period per week (each of 60 minutes) | Lecture | 03 | |
| | Laboratory | --- | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | 01 | 20 X 02 |
| | End Semester* | 03 | 100 |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | --- |
| | **TOTAL** | | **100** |

* 60% Weightage for end semester

**Rationale:**

Engineering mechanics deals with the particles / bodies which are at rest or in motion under the action of various types of forces. This course is the foundation to many fields of engineering / technology and hence it is an essential requirement for their study.

**Course Objectives:**

The main objectives of the course are

- To introduce the students to the principles and methods of dynamics (mechanics), and to apply those fundamentals to solve the problems on dynamics.
- To prepare the base for the students to study other engineering/structural engineering courses at a later stage.

**Course Outcomes:**

At the end of the course the students shall be able to

1. Find the centroid and moment of inertia of plane areas.
2. solve the problems on kinematics of particles and kinematics of rigid bodies.
3. solve the problems on kinetics of particles and kinetics of rigid bodies.

**Course Contents:**

| **Module No.** | **Details** | **Hrs.** |
|---|---|---|
| 01 | **Centroid of Plane Areas:** Concept of Centroid of plane areas. Centroid of areas by integration. Centroid of composite areas. | 04 |
| 02 | **Moment of Inertia:** Moment of inertia of plane areas, parallel axis theorem. Introduction to polar moment of inertia, product of inertia and mass moment of inertia. | 03 |
| 03 | **Kinematics of particle:** Velocity and acceleration in terms of rectangular coordinate system, rectilinear motion, motion along plane curved path, tangential and normal component of acceleration, acceleration - time , velocity- time, graphs and their use, relative velocity, projectile motion, simple harmonic motion. | 10 |
| 04 | **Kinematics of rigid bodies:** Translation, pure rotation and plane motion of rigid bodies, instantaneous | 06 |

| | | |
|---|---|---|
| | centre of rotation for the velocity for bodies in plane motion, link mechanisms (upto two links). | |
| 05 | **Kinetics of particles:**<br>Newton's laws of motion, D'Alembert's principle, equation of dynamic equilibrium, linear motion, curvilinear motion. | 04 |
| 06 | **Energy and Momentum principles:**<br>Work done by a force, potential and kinetic energy, power, work energy equation, principle of conservation of energy, momentum, impulse and momentum principle, principle of conservation of momentum, impact of solid bodies, elastic impact, semi-elastic impact and plastic impact. | 07 |
| 07 | **Kinetics of rigid bodies:**<br>D'Alembert's principle for bodies under translational motion, rotational motion about a fixed axis and plane motion. Application to motion of bars, cylinders, spheres. | 06 |

**Reference Books:-**

1. B. N. Thadani(1966); "Engineering Mechanics", Asia Publishing House, ISBN 0210269405, 655 pages
2. Beer & Johnson (2013), "Engineering Mechanics", Tata McGraw Hill, ISBN 1259062919, 470 pages
3. F. L. Singer (1975), "Engineering Mechanics", Harper & Raw Publication, ISBN 0060462329, 724 pages
4. A. Nelson (2009), "Engineering Mechanics", Tata McGraw Hill, ISBN 0070146143
5. Shames (2006), 'Engineering Mechanics', Prentice Hall, India, ISBN 8177581236, 837 pages

**Text Books:-**

1. R. C. Hibbeler (2007); "Engineering Mechanics", Pearson Education Inc., ISBN 0132215098, 656 pages
2. A. K. Tayal (2010), 'Engineering Mechanics', Umesh Publication, ISBN 9380117388
3. Kumar(1956), "Engineering Mechanics", Tata McGraw Hill, ISBN 0070681813, 673 pages

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T – I | Module 1, 2 & part of module 3 |
| 2 | T – II | Part of module 3, Module 4 & 5 |
| 3 | End Semester | Module 1 to 7 |

| **SEMESTER-II** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT205** | **COURSE: Applied Physics -II** | | |
| **Prerequisites** | **Std. XII Physics, BT105** | | |
| Period per week (each of 60 minutes) | Lecture | 02 | |
| | Laboratory | --- | |
| | Tutorial | --- | |
| Evaluation system | | Hours | Marks |
| | In Semester | 01 | 20 X 02 |
| | End Semester* | 03 | 75 |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | --- |
| | **TOTAL** | **---** | **85** |

* 60% Weightage for end semester

**APPLIED PHYSICS – II**

**Rationale:**

A strong applied sciences programme, that creates a bridge between the sciences and engineering, for first-year students, is a prerequisite for a good engineering programme. This syllabus primarily focuses on the concepts needed for first year engineering students for their further technological studies.

**Course Objectives:**

1. To explore different crystal structures, crystal plane orientations in cubic structures, and determine crystal properties using X-rays.
2. To analyse magnetism in magnetic materials and understand theory of static electric and magnetic fields using principles of divergence and curls.
3. To introduce Special theory of Relativity.

**Course Outcomes:**

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

1. Explain types of crystal structures using unit cell properties and learn the application of X-rays for determining crystal structures and crystal planes.
2. Understand classes of magnetic materials and their properties and analyse electrostatic and magnetostatic fields by principles of divergence and curls.
3. Acquire knowledge of special theory of relativity from theories of length contraction and time dilation principles.

**Course Contents:**

| **Module No.** | **Details** | **Hrs.** |
|---|---|---|
| 1 | **Crystallography:**<br>Basic concepts: Seven basic types of crystal systems, lattice, basis, crystal axes, unit cells, lattice parameters, co-ordination number, atomic packing factor, void space. | 6 |

| | | |
|---|---|---|
| | Crystal structures: SC, BCC, FCC, Diamond and NaCl.<br>Crystal planes and directions: Miller indices, drawing of crystal planes and directions in a simple cubic unit cell, interplanar spacing between planes, important planes of SC,BCC and FCC structures. | |
| 2. | **X-rays:**<br>Production of X-rays in laboratory, Types of X-rays, Continuous and characteristic X-ray spectrum, X-ray diffraction and Bragg's law, Bragg's X-ray spectrometer, Applications in crystallography. | 4 |
| 3 | **Magnetic materials and circuits:**<br>Prerequisite: different types of magnetic materials.<br>Atomic origin of magnetization, magnetic moment of atom, paramagnetic, diamagnetic and ferromagnetic materials. Langevin's theory of paramagnetism and Curie's law, Curie-Weiss law.<br>Hysteresis and hysteresis loss.<br>Magnetic circuits: basic definitions and relation with electric circuits, Ohm's law for magnetic circuits. | 8 |
| 4 | **Electrostatics:**<br>Concept of gradient, divergence and curl. Fundamental theorems: of calculus, for gradients, for divergences and for curls.<br>Divergence and curl of electrostatic fields, Gauss' law, introduction to scalar potential, relation of potential with field.<br>**Magnetostatics:**<br>Divergence and curl of B, Biot Savart law, magnetic vector potential. Comparison of Electrostatics and magnetostatics. | 8 |
| 5 | **Special Theory of Relativity:** Result of Michelson-Morley Experiment, Postulates of STR, Galilean transformation, Lorentz transformation, Simultaneity, Length contraction, Time dilation, Addition of velocities, Variation of mass with velocity, Mass-energy relation. | 8 |

**Reference Books**:-

1. Charles Kittel (2004), 'Introduction to Solid State Physics',John Wiley & Sons; 8th Edition, ISBN 0471415268, 704 Pages
2. S.O. Pillai (2010), 'Solid State Physics', 6th Edition, New Age International Publishers, ISBN 9788122427264, 832 pages.
3. A.J Dekker (2000), 'Solid State Physics', Macmillan India 1st Edition, ISBN 0333918339, 556 Pages
4. M. Ali Omar (1999), 'Elementary Solid State Physics', Pearson Education Publication 5th Edition, ISBN 8177583778, 669 Pages
5. Arthur Beiser (2009), 'Concepts of Modern Physics',TataMcGraw Hill, 6th Edition, ISBN 0070151555
6. David J. Griffiths (2012), 'Introduction to Electrodynamics', PHI Publications 4th Edition, ISBN 8120347765
7. Robert Resnik (1979), 'Introduction to Special Relativity', Wiley India Edition, ISBN 0471717258, 248 Pages

**Text Books:-**

1. Kshirsagar and Avadhanulu (1992), 'a Textbook of Engineering Physics', S. Chand Publications, ISBN 8121908175, 758 pages
2. A.S. Vasudeva (2008), 'Modern Engineering Physics', S. Chand Publications, ISBN 8121917573, 383 Pages
3. Hitendra K. Malik and AK Singh (2013), 'Engineering Physics', Mc Graw Hill Publications, ISBN 0070671532
4. G Vijayakumari (2006), 'Engineering Physics' Vikas Publishing House, ISBN 9788125924098, 425 Pages

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T-1 | Module 1and 2 |
| 2 | T-2 | Module 3and 4 |
| 3 | Final Examination | Module 1 to 5 |

| **SEMESTER-II** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT206** | **COURSE: Applied Chemistry -II** | | |
| **Prerequisites** | **Std. XII Chemistry, BT106** | | |
| Period per week (each of 60 minutes) | Lecture | 02 | |
| | Laboratory | --- | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | 01 | 20 X 02 |
| | End Semester* | 03 | 75 |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | --- |
| | **TOTAL** | **---** | **85** |

* 60% Weightage for end semester

**APPLIED CHEMISTRY – II**

**Course Objectives:**

The main objective of the course are

1. To introduce the students to basic knowledge of alloy, fuel, green chemistry, corrosion and its protection.
2. To introduce the student to theory, principles and mechanism of chemical processes.
3. To introduce the application of chemistry in engineering and technology.

**Course Outcomes:**

After successful completion of this course, the student will able to :

1. Analyse process corrosion and its protection methods.
2. Classify different types of alloy and their properties.
3. Determine fuel characteristics, properties and their application.
4. Implement use of green chemistry.

**Course Contents:**

| **Module No.** | **Details** | **Hrs.** |
|---|---|---|
| 1 | **Corrosion:** Definition, Types of corrosion-Dry or Chemical Corrosion, Wet or Electrochemical corrosion, Bi-metallic corrosion, Concentration cell corrosion-differential Aeration corrosion, Pitting Corrosion, Water Line Corrosion, stress Corrosion, Inter-granular Corrosion. Polarization, over voltage, Passivity, Factors affecting rate of corrosion. Electrochemical & Galvanic series. | 06 |
| 2 | **Protection from Corrosion** - Cathodic and Anodic Protection, Cathodic and Anodic coatings, Galvanising & Tinning, Metal-Cladding, electroplating.Corrosion in electronic devices and photonic devices. | 04 |

| | | |
|---|---|---|
| 3 | **Composite Materials**:<br>Introduction, classification, constitution& characteristic properties of particle, fibre reinforced composites, structural composites.<br>Applications of Composite Materials. | 04 |
| 4 | **Alloys:**<br>Alloys of Al, Cu and Pb - their composition, properties & uses. | 04 |
| 5 | **Powder Metallurgy:**<br>Methods of Metal Powder Formation, Cermets-Metal-Ceramic Powders, technology of Powder Metallurgy, applications of Powder Metallurgy. | 04 |
| 6 | **Fuel:**Calorific Value-Gross and Net Calorific Value, Conversion & numerical problems.Proximate and Ultimate Analysis of Fuels, numerical problems.Combustion-Calculations for given Solid, Liquid, Gaseous Fuel<br>Biodiesel-Methods to obtain Biodiesel.<br>Cracking, Knocking, Octane Value of Petrol, Cetane Value of Diesel, Anti-Knocking Agents.Recent technologies for catalytic converter. | 06 |
| 7 | **Green-Chemistry:** Goal, Significance and 12-Principles of Green Chemistry with examples, Green Path Green-Reagents, SCFE, SC-$CO_2$,green propelent – ultra pure $H_2O_2$ .<br>Industrial applications of Green-Chemistry.<br>Numerical problems on percentage atom economy. | 06 |

**Reference Books:-**

1. P.C.Jain& Monica Jain (2004), 'Engineering Chemistry', DhanpatRai publishing company Pvt. Ltd, 15th Edition, ISBN 8187433175, 1288 Pages
2. Emil Roduner (2006), 'Nano Scopic Materials', RSC Publishing, ISBN 0854048571, 285 Pages
3. VasantGowarikar (1986), 'Polymer science', New Age International Pvt Ltd, ISBN 0852263074, 505 Pages
4. Cotlon (1994), 'Basic Inorganic Chemistry', Wiley India, 3rd Edition, ISBN 0471505323, 856 Pages

**Text Books:-**

1. O.P. Khanna (2010), 'Material Science for engineering students', DhanpatRai, Publications (p) Ltd., ISBN 8189928317, 1179 Pages.
2. S. S. Dara&Dara (1986), 'Engineering Chemistry', S. Chand & Company Ltd, 12th Edition, ISBN 8121903599, 992 Pages

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T-1 | Module 1 ,2and 4,5 |
| 2 | T-2 | Module 6 |
| 3 | Final Examination | All Module |

| **SEMESTER - II** | **CLASS: - F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT207** | **COURSE :- Computer Programming** | | |
| **Prerequisites** | **Basic knowledge of computers** | | |
| Period per week (each of 60 minutes) | Lecture | 04 | |
| | Practical | --- | |
| | Tutorial | | |
| Evaluation system | | Hours | Marks |
| | In Semester | 01 | 20 x 02 |
| | End Semester* | 03 | 100 |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | --- |
| | **TOTAL** | **---** | **100** |

*60% Weightage for end semester

**Course Objectives**:

1. Master basic procedural programming constructs for decision and iteration.
2. Understand principles like decomposition, information hiding, and use of parameters and return values to create flexible components.
3. Understand major concept of object oriented programming like encapsulation, inheritance and polymorphism

**Course Outcomes**:

1. Remember Data types and apply basics of Control Structures to programming.
2. Design programs using functions, arrays, strings.
3. Understand and apply the knowledge of OOPS to write programs

**Course Contents:-**

| **Module No** | **Details** | **Hrs** |
|---|---|---|
| 1. | **Basics of Programming:**<br>Defining problem statement, solution development using Algorithmic approach.Basic concepts of computer structure and program execution | 05<br>03 |
| 2 | **Basic Data Type:**<br>Concept of Variables and constants, Data types, expressions, and assignment, Input / Output from console and file. | 05 |
| 3 | **Control Structure:**<br>Conditional execution – if/else, Switch, Break, Continue.<br>Iteration – Do, for, while | 04<br>03 |

| | | |
|---|---|---|
| 4 | **Functions:**<br>Defining Functions- Procedural decomposition of problems, localizing variables, parameter passing– value and reference, return values. | 08 |
| 5 | **Arrays:**<br>Arrays – one-dimensional, Multidimensional<br>Strings | 06<br>03 |
| 6 | **Principles of Object Oriented Programming:**<br>Introduction to Object Oriented Language – classes, Constructor and Destructors.Inheritance – Access specifiers, Types of Inheritance | 05<br>04 |
| 7 | **Polymorphism:**<br>Compile time polymorphism: Function and operator overloading.<br>Runtime Polymorphism: Virtual Functions. | 06 |

**Text Books:**

1) BalaguruSwami (2008),"Object Oriented Programming with C++", Tata McGraw-Hill PublishingCompany Ltd., 3 rd Edition, ISBN 0070669074, 624 Pages
2) Bjarne Stroustrup (2013) ,"The C++ Programming Language", Addison Wesley Publishing Company, 4 th Edition, ISBN 0321563840, 1368 Pages.

**Reference Books:**

**1)** Mahesh Bhave and Sunil Patekar (2012), "Object- Oriented Programming with C+ + , Pearson Education, 1 st Edition, ISBN 8131798585, 688 Pages.
2)Robert Lafore (2001), "Object-Oriented Programming in C++", Sams Publishing 4 th Edition, ISBN 0672323087, 1040 Pages

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T – I | Module 1 , 2,3 |
| 2 | T – II | Module 4,5 |
| 3 | End Semester | All 1 to 7 |

| **SEMESTER-II** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT252** | **COURSE: Basic Electrical and Electronics II** | | |
| **Prerequisites** | **BT202** | | |
| Period per week (each of 60 minutes) | Lecture | --- | |
| | Laboratory | 02 | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | --- | --- |
| | End Semester* | --- | --- |
| | Practical | -- | -- |
| | Laboratory Work (Journal) | ---02--- | 25 |
| | **TOTAL** | **---** | **25** |

# Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

(i) Attendance in Laboratory/Tutorial = 20%,
(ii) Journal/Drawing sheet/Sketch book = 40%,
(iii) MCQ/Oral/Test = 40%.

**Course Objective**

1) To aware the students about the experimental methods to plot characteristics of various Electronics devices.

**2)** To make use of Electronics devices for various applications

**Course Outcomes**

At the end of the course the students will be able to –
1) Able to design various Electronics circuits

**List of Experiments:**

1. To plot V-I characteristics for PN junction diode and Zener diode.
2. To understand the performance of Rectifier without & with filters.
3. To Build Voltage regulator using Zener diode.
4. To Plot Input & Output Characteristics of BJT (CE- configuration).
5. To Plot Transfer & Drain Characteristics of FET .
6. To find Voltage Gain of Single Stage CE amplifier.
7. To find Voltage Gain of CS amplifier.
8. To verify truth table of Logic gates.
9. To Implement basic gates using universal gates.
10. To study Op-amp. As Inverting amplifier, Non-Inverting amplifier & Buffer.

**Note**: Practical examination will be as follows:
Attendance 20%, Practical performed during semester and graded Journals 40%,
Practical/Mini Project 40%

| **SEMESTER-II** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT253** | **COURSE: Engineering Graphics-II** | | |
| **Prerequisites** | **BT203** | | |
| Period per week (each of 60 minutes) | Lecture | --- | |
| | Practical | --- | |
| | Tutorial | 02 | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | --- | --- |
| | End Semester* | --- | --- |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | 25 |
| | **TOTAL** | | **25** |

# Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

(i) Attendance in Laboratory/Tutorial = 20%,
(ii) Journal/Drawing sheet/Sketch book = 40%,
(iii) MCQ/Oral/Test = 40%.

**Termwork:**

Term work shall comprise of printouts of Autocad drawings consisting of 2 to 3 problems on each module. The class assignments and each Autocad drawing shall have equal weightage in termwork marks.

| **SEMESTER-II** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT255** | **COURSE: Applied Physics -II** | | |
| **Prerequisites** | **BT205** | | |
| Period per week (each of 60 minutes) | Lecture | --- | |
| | Laboratory | 02* | |
| | Tutorial | --- | |
| Evaluation system | | Hours | Marks |
| | In Semester | --- | --- |
| | End Semester* | --- | --- |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | 15 |
| | **TOTAL** | **---** | **15** |

* Alternate weeks

**Laboratory objectives (General)**

- To setup state of the art physics laboratory so as to master basic physics concepts
- To help the students develop a broad array of basic skills and tools of experimental physics.
- To help students develop collaborative learning skills that are vital to success in the field of engineering.

**Laboratory Objectives:**

1. To setup theory related laboratory experiments on crystal physics and magnetismso as to apply his/her theoretical knowledge to a practical situation.

**Laboratory Outcomes:**

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

1. Explain unit cell properties of different crystal structures studied in the theory and identify different crystal plane orientations.
2. Understand ferromagnetism on the basis of Hysteresis curve.
3. Use a C.R.O for voltage and frequency measurements and obtain Lisaajous figures using the same.

# Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

(i) Attendance in Laboratory/Tutorial = 20%,
(ii) Journal/Drawing sheet/Sketch book = 40%,
(iii) MCQ/Oral/Test = 40%.

**List of Experiments: (Minimum 5 to be performed)**

1. To identify crystal structures: SC, BCC, FCC, Diamond, HCP, NaCl.
2. To identify crystal planes (100), (110) and (111) for SC, BCC and FCC crystal structures.
3. Hall Effect: to find hall voltage of a given semiconductor.

4. Hysteresis: to plot the hysteresis curve for a ferromagnetic material and determine retentivity and coercivity.
5. Introduction to C.R.O: to measure a.c. voltage and frequency.
6. Lissajous figures using a C.R.O.
7. e/m apparatus: to find e/m ratio.

| **SEMESTER-II** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT256** | **COURSE: Applied Chemistry -II** | | |
| **Prerequisites** | **BT206** | | |
| Period per week (each of 60 minutes) | Lecture | --- | |
| | Laboratory | 01 | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | --- | --- |
| | End Semester* | --- | --- |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | 15 |
| | **TOTAL** | **---** | **15** |

# Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

(i) Attendance in Laboratory/Tutorial = 20%,
(ii) Journal/Drawing sheet/Sketch book = 40%,
(iii) MCQ/Oral/Test = 40%.

**Course Objectives:**
The main objective of the course are
1. To introduce the students to basic knowledge of material chemistry.
2. To correlate theory with experiment.
3. Application of chemistry in engineering and technology.

**Course Outcomes:**
After successful completion of this course, the student will able to :
1. Find out composition of metals in different alloy.
2. Prepare and characterize new composite material.
3. Prepare bio-diesel from edible oil.

**TERM-WORK: LIST OF EXPERIMENT (ONLY ANY FIVE TO PERFORM)**
**List of Experiments: (Minimum 5 to be performed)**

1. Estimation of Cu iodometrically.
2. Estimation of Zn complexometric titration.
3. Estimation of Ni complexometric titration.
4. Estimation of Al complexometric titration.
5. Calorific value of solid or liquid fuel using Bomb calorimeter.
6. Preparations of membranes for filter any one Demo.
7. CO2 from air by Orsat's method.
8. Estimation of Fe by gravimetric method.
9. Estimation of Ni by gravimetric method.
10. Estimation of Sn iodometrically.
11. Preparation of biodiesel from edible oil.
12. Synthesis of simple layered materials and their characterization.
13. Preparing simple composites and their characterization.

| **SEMESTER - II** | **CLASS :- F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT257** | **COURSE :- Computer Programming** | | |
| **Prerequisites** | **BT207** | | |
| Period per week (each of 60 minutes) | Lecture | --- | |
| | Practical | 02 per batch | |
| | Tutorial | | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | --- | --- |
| | End Semester* | --- | --- |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | 25 |
| | **TOTAL** | **---** | **25** |

# Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

(i) Attendance in Laboratory/Tutorial = 20%,
(ii) Journal/Drawing sheet/Sketch book = 40%,
(iii) MCQ/Oral/Test = 40%.

**Course Objectives:**

1. Write and debug small programs.
2. Manipulate various Data types and Apply basic programming concepts like loops, functions, arrays in programs.
3. Apply Object Oriented programming approach to various problem statements.

**Course Outcomes:**

1. Construct programs using Control Structures.
2. Implement the use of functions and Arrays in C++ language.
3. Carry out programming using different features of OOPs.

**List of experiments: (preferably six to be performed)**

1. To Write C-Programs Using Operators and Expressions (any-4).
2. To Write C-Programs Using If-Else statement.
3. To Write C-Program Using While, Do-While loops.
4. To Write C-Program Using FOR loop.
5. To Write C-Program Using Functions.
6. To Write C-Program Using Arrays.
7. To Write C-Program Using Strings.
8. To Write C-Program Using classes and objects.
9. To Write C-Program based on Compile time polymorphism.
10. To Write C-Program Using Inheritance.
11. To Write C-Program based on run time polymorphism

| **SEMESTER-II** | **CLASS: F.Y.B.Tech. (Civil/Mechanical/Electrical)** | | |
|---|---|---|---|
| **CODE: BT299** | **COURSE: Workshop - II** | | |
| **Prerequisites** | **BT199** | | |
| Period per week (each of 60 minutes) | Lecture | --- | |
| | Laboratory | 03 per batch | |
| | Tutorial | --- | |
| Scheme of Evaluation | | Hours | Marks |
| | In Semester | --- | --- |
| | End Semester | --- | --- |
| | Practical | --- | --- |
| | Laboratory Work (Journal) | --- | 50 |
| | **TOTAL** | | **50** |

* 60% Weightage for end semester

**Rationale:**
Workshop forms not an indispensible part of any industry. An engineer working in field must have thorough knowledge of various tools, machines, devices used in engineering practice for creating objects from material. The students of engineering discipline must be conversant with the various operations performed on materials for producing desired shapes with comprehensive knowledge of working principles of machine tools, use of tools and devices with their effective use and application. Basic Workshop Practice is a practical course which emphasizes on laying basic foundation for an engineering student.

**Course Objectives:**

1. To impart knowledge to students to develop their technical skill sets for creating entities from raw material.
2. To give “hands on” training and practice to students for use of various tools, devices, machines.
3. To develop ability of students to understand, plan and implement various processes and operations to be performed on the raw material to create object of desired shape and size.
4. To give exposure to inter disciplinary domains.

**Course Outcomes:**

1. Thorough knowledge of various tools, machines, devices used in engineering practice for creating objects from material.
2. Thorough knowledge of carrying out various operations in basic engineering shops
3. Ability of interpretation of job drawing, application of processes and operations to produce basic components from raw material.

# Assessment criteria for laboratory/Tutorial work. i.e. weightage for assessment shall be as follows:

(i) Attendance in Laboratory/Tutorial = 20%,
(ii) Journal/Drawing sheet/Sketch book = 40%,
(iii) MCQ/Oral/Test = 40%.

**Course Contents:**

| Module No. | Details | Hrs. |
|---|---|---|
| 01 | Fitting (Compulsory):-<br>• Use and settings of fitting hand tools for marking, chipping, cutting, filing, centre punching, hammering, drilling, tapping.<br>• Term work to include one job:- Male –female joint involving above operations. | 12 |
| 02 | Carpentry (Compulsory):-<br>• Use and setting of carpentry hand tools like hacksaws, jackplanes, chisels and gauges for construction of various joints. Term work to include one job involving a use of tools and operations:- Half Check joint. | 12 |
| 03 | Carpentary (Demonstartion):-<br>• Wood turning Demonstration. | 03 |
| 04 | Forging / Smithy (Demonstration):-<br>• One job: - Lifting Hook and Handle to be demonstrated by instructor to a batch. | 04 |
| 05 | Welding ( Demonstration):-<br>• Edge preparation for welding jobs, arc welding, different types of joints such as Lap Welding, Butt Welding etc.<br>• One job each involving Lap welding and Butt welding of two plates to be demonstrated by instructor to a batch. | 04 |
| 06 | Machine Shop (Demonstration):-<br>4. One turning job to be demonstrated by instructor to a batch. | 04 |
| 07 | Electrical Board Wiring (Demonstration):-<br>5. House wiring, staircase wiring for fluorescent tube light, go-down wiring and three phase wiring for electrical motors. | 03 |

**Termwork:**

Every student has to perform one job from one compulsory trade and attend demonstration in two trades in each of semester I and II. Term work shall comprise of 01 compulsory job and demonstration jobs (any two) performed in the semester.

The syllabus of Basic Workshop Practice and term work to be done in Semester –I & II are given together. The jobs for practice and demonstration are designed with the work of the course spread over two semesters. In each semester every student has to perform a job in one compulsory trade and attend demonstrations in other two trades.

| Sr. No. | Examination | Module |
|---|---|---|
| 1 | T-1 | Module 1 and 2 |
| 2 | T-2 | Module 3 and 4 |
| 3 | Final Examination | Module 1 to 7 |