SCHEME & SYLLABUS OF B. Tech. 1st& 2nd SEMESTER

(Common to all B. Tech. branches)

Batch-2011

By

Department of Academics

PUNJAB TECHNICAL

UNIVERSITY Page 2

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

2

Physics Group

B. Tech. First Year 2011

Contact Hours: 32 Hrs.

Chemistry Group

B. Tech. First Year 2011

Contact Hours: 34 Hrs

Physics Group + Chemistry Group + General Fitness= 750 +750+100= 1600 Marks

Course Code

Course Name

Load Allocation

Marks Distribution

Credits

L

T

P

Internal

External

Total

BTPH101

Engineering Physics

3

1

-

40

60

100

4

BTAM101

Engineering Mathematics-I

4

1

-

40

60

100

5

BTHU101

Communicative English

3

0

-

40

60

100

3

BTEE 101

Basic Electrical and

Electronics Engineering

4

1

-

40

60

100

5

HVPE101

Human Values and

Professional Ethics

3

-

-

40

60

100

3

BTPH102

Engineering Physics

Laboratory

-

-

2

30

20

50

1

BTHU102

Communicative English

Laboratory

-

-

2

30

20

50

1

BTEE102

Basic Electrical and

Electronics Engineering

Laboratory

-

-

2

30

20

50

1

BTMP101

Manufacturing Practice

-

-

6

60

40

100

3

Total

5Theory Courses + 4

Laboratory Courses

17

3

12

350

400

750

23

Course Code

Course Name

Load Allocation

Marks Distribution

Credits

L

T

P

Internal

External

Total

BTCH 101

Engineering Chemistry

3

1

-

40

60

100

4

BTAM102

Engineering Mathematics-II

4

1

-

40

60

100

5

BTME101

Elements of Mechanical

Engineering

4

1

-

40

60

100

5

BTCS 101

Fundamentals of Computer

Programming and IT

3

-

-

40

60

100

3

EVSC 101

Environmental Science

2

0

-

40

60

100

2

BTCH102

Engineering Chemistry

Laboratory

-

-

2

30

20

50

1

BTME102

Engineering Drawing

1

-

6

40

60

100

4

BTCS 102

Fundamentals of Computer

Programming and IT

Laboratory

-

-

4

30

20

50

2

BTME103

Engineering Computer

Graphics Laboratory

-

-

2

30

20

50

1

Total

6Theory Courses + 3

Laboratory Courses

17

3

14

320

380

750

27 Page 3

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

3

BTPH 101 Engineering Physics

Objective/s and Expected outcome:

The objective of the course is to develop a scientific temper and analytical capability

in the engineering graduates through the learning of physical concepts and their application in engineering & technology. Comprehension of some basic physical concepts will enable graduates to think logically the engineering problems that would come across due to rapidly developing new technologies. The student will be able to understand the various concepts effectively; logically explain the physical concepts; apply the concept in solving the engineering problem; realize, understand and explain scientifically the new developments and breakthroughs in engineering and technology; relate the developments on Industrial front to the respective physical activity, happening or phenomenon.

PART A

1. EM waves & Dielectrics: Physical significance of Gradient, Divergence & Curl, Relationship between Electric Field & Potential, Dielectric polarization, displacement Current, Types of polarization, Maxwell‟s Equations, Equation of EM waves in free space, velocity of EM waves, Poynting vector, Electromagnetic Spectrum (Basic ideas of different region).

(5)

2. Magnetic Materials & Superconductivity: Basic ideas of Dia, Para, Ferro & Ferri, Ferrites, Magnetic Anisotropy, Magnetostriction its applications in production of Ultrasonic waves, Superconductivity, Superconductors as ideal diamagnetic materials, Signatures of Superconducting state, Meissner Effect, Type I & Type II superconductors, London Equations, Introduction to BCS theory.

(5)

3. Elements of crystallography: Unit cell, Basis, Space lattice, Crystal Systems, Miller Indices of Planes & Directions in cubic system, Continuous &

Characteristic X-Rays, X-Ray Diffraction & Bragg‟s law in Crystals, Bragg‟s spectrometer, X-ray radiography.

(5)

4. Lasers: Spontaneous & Stimulated emissions, Einstein‟s Coefficients, Population Inversion, Pumping Mechanisms, Components of a laser System, Three & four level laser systems; Ruby, He-Ne, CO2 and semiconductor Lasers, Introduction to Holography.

(5)Page 4

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

4

PART B

5. Fibre Optics: Introduction, Acceptance Angle, Numerical Aperture, Normalized frequency, Modes of propagation, material dispersion & pulse broadening in optical fibres, fibre connectors, splices and couplers, applications of optical fibres.

(5)

6. Special Theory of Relativity: Concept of Ether, Michelson Morley Experiment, Einstein‟s postulates, Lorentz transformation equations; length, time and simultaneity in relativity, addition of velocity, variation of mass with

velocity, Mass-Energy and Energy-momentum relations.

(5)

7. Quantum Theory: Need and origin of quantum concept, Wave-particle duality, Matter waves, Group & Phase velocities, Uncertainty Principle, Significance & normalization of wave function, Schrodinger wave equation: time independent & dependent, Eigen functions & Eigen values, particle in a box.

(5)

8. Nanophysics: Nanoscale, surface to volume ratio, electron confinement, nanoparticles (1D, 2D, 3D), Nanomaterials, Unusual properties of nanomaterials, synthesis of nanomaterials- ball milling and sol-gel techniques, Carbon nanotubes (synthesis and properties), applications of nanomaterials.

(5)

Suggested Readings / Books:

1. Physics for Scientists & Engineers (Vol. I & II), Serway & Jewett, 6th Edition., Cengage Learning.

2. Engineering Physics, Malik; HK, Singh; AK, Tata McGraw Hill,

3. Materials Science & Engg., Raghvan V.,Prentice Hall of India.

4. Concepts of Modern Physics, Beiser; A., Mahajan; S., Choudhary; SR, Tata McGraw Hill.

5. Solid State Physics, Dan Wei, Cengage Learning.

6. Introduction to Solids, Azaroff LV, Tata Mc Graw Hill.

7. Physics; A calculus based approach (Vol. I & II) Serway; RA & Jewitt; JW, Cengage Learning.Materials Science & Engineering, Callister; WD, John Wiley & Sons.

8. Introduction to Electrodynamics, Griffiths; DJ, Prentice Hall.

9. Lasers & Optical engineering, Dass; P, Narosa Publishers.

10. Optical Fibre system, Technology, Design & Applications, Kao; CK, McGraw Hill.

11. Laser Theory & Applications, Thygrajan; K, Ghatak; AK, Mc Millan India Ltd. Page 5

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

5

BTAM 101Engineering Mathematics-I

Objective/s and Expected outcome

“Math and basic science are certainly the foundations of any engineering program. This fact will not change in the foreseeable future” said by Ellis et al. Engineering Mathematics is an essential tool for describing and analyzing engineering processes and systems. Mathematics also enables precise representation and communication of knowledge. Core mathematics courses have broader objectives than just supporting engineering programs. The learning objectives of core mathematics courses can be put into three categories: (1) Content Objectives: Students should learn fundamental mathematical concepts and how to apply them. (2) Skill Objectives: Students should learn critical thinking, modeling/problem solving and effective uses of technology. (3) Communication Objectives: Students should learn how to read mathematics and use it to communicate knowledge. The students are

expected to understand the fundamentals of the mathematics to apply while designing technology and creating innovations.

PART A

1. Differential Calculus: Curve tracing: Tracing of Standard Cartesian; Parametric and Polar curves; Curvature of Cartesian, Parametric and Polar curves.

(6)

2. Integral Calculus: Rectification of standard curves; Areas bounded by standard curves; Volumes and surfaces of revolution of curves; Applications of integral calculus to find centre of gravity and moment of inertia.

(6)

3. Partial Derivatives: Function of two or more variables; Partial differentiation; Homogeneous functions and Euler‟s theorem; Composite functions; Total derivative; Derivative of an implicit function; Change of variable; Jacobians.

(6)

4. Applications of Partial Differentiation: Tangent and normal to a surface; Taylor‟s and Maclaurin‟s series for a function of two variables; Errors and approximations; Maxima and minima of function of several variables; Lagrange‟s method of undetermined multipliers.

(6)

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

6

PART B

5. Multiple Integrals: A brief introduction of cylinder, cone and standard conicoids. Double and triple integral and their evaluation, change of order of integration, change of variable, Application of double and triple integration to find areas and volumes.

(6)

6. Vector Calculus: Scalar and vector fields, differentiation of vectors, velocity and acceleration. Vector differential operators: Del, Gradient, Divergence and Curl, their physical interpretations. Formulae involving Del applied to point functions and their products. Line, surface and volume integrals.

(8)

7. Application of Vector Calculus: Flux, Solenoidal and Irrotational vectors. Gauss Divergence theorem. Green‟s theorem in plane, Stoke‟s theorem (without proofs) and their applications.

(4)

Suggested Readings / Books

1. Thomes, G.B, Finney, R.L. Calculus and Analytic Gemetry, Ninth Edition, Peason Education.

2. Kreyszig, E., Advanced Engineering Mathematics, Eighth edition, John wiley.

3. Peter. V. O‟ Nil, Advanced Engineering Mathematics, Wordsworth Publishing Company.

4. Jain, R.K and Lyengar, S.R.K., Advanced Engineering Mathematics, Narosa

Publishing Company.

5. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi.

6. Taneja, H.C., Engineering Mathematics, Volume-I & Volume-II, I.K. Publisher.

7. Babu Ram, Advance engineering Mathematics, Pearson Education.

8. Bindra,. J.S., Applied Mathematics, Volume-I, Kataria Publications. Page 7

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

7

BTHU 101 Communicative English

Objective/s and Expected outcome:

The objective is to help the students to become independent users of english language. Students should be able to understand spoken and written english language of varied complexity on most including some abstract topics; particularly the language of their chosen technical field. They must show awareness of appropriate format and a capacity for explaining their views in a rational manner. The students should be able to converse fluently, without strain with international speakers of english in an accent and lexis that is widely understood across the globe. They will be able to produce on their own texts which are clear and coherent.

1. Reading: Reading texts of varied complexity; speed reading for global and detailed meaning; processing factual and implied meanings

2. Vocabulary: Building up and expansion of vocabulary; active use of the prescribed expressions in the appropriate context

3. Grammar: Revising and practicing a prescribed set of grammar items; using grammar actively while processing or producing language

4. Writing: The qualities of good writing; Learning the prescribed written expressions of conventional use; writing business letters, emails; reports, summaries and various forms of descriptive and argumentative essays

Learning and Teaching Activities:

PART A (Reading)

The prescribed reading textbook for students will be S. P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD), Orient Blackswan. They will go through the reading texts themselves with the help of a dictionary or word power as given at the end. As they progress from one reading to another they should learn to read fast with greater degree of understanding of both concrete and abstract topics. While taking up the textbook lessons in the classroom, the teacher shall ensure that students can do the following:

i.

Identify the significant points and conclusions as given in the text.

ii.

Handle large texts (even outside the prescribed book) with overall comprehension of the links between arguments and the finer distinction between stated and implied meanings.

iii.

Generally read the stance or the point of view of the writer and present it in the form of a summary

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

8

iv.

Use the vocabulary learnt in the lessons (especially given in „word power‟)

productively in various writing tasks as suggested at the end of each lesson.

v.

Profitably use the grammatical items as discussed at the end of each lesson

while producing language for communication.

Besides the textbook, the teacher must insist that students extend their reading by

taking up additional texts of their own choice.

PART B (Writing)

In addition to the various exercises given at the end of each lesson of Dhanavel‟s

book, the teacher shall use Anne Laws Writing Skills, Orient Blackswan to teach the

language and conventions of writing. The students must learn the language that

expresses various cognitive functions that are frequently used in writing. With the

help of the teacher who will give them adequate practice, the students should be

able to:

i. Convey information on concrete or abstract topics with clarity and precision.

ii. Write about objects or events with appropriate detail in both descriptive and narrative

form.

iii. Explain ideas and build up arguments with adequate support in a convincing manner.

iv. Use language with some degree of flexibility in consideration to the reader.

v. Produce effectively such forms of professional writing as business letter, emails, notes, memos, reports summaries etc.

While teaching, the teacher must inculcate in students the habit of revising their writing. The teacher can also use and recommend the relevant sections of the following books for developing writing skills in students.

Suggested Readings/ Books

1. Vandana R Singh, The Written Word, Oxford University Press, New Delhi

2. KK Ramchandran, et al Business Communication, Macmillan, New Delhi

3. Swati Samantaray, Busines Commnication and Commnicative English, Sultan Chand, New Delhi.

4. S.P. DhanavelEnglish and Communication Skills for Students of Science and Engineering (with audio CD) Page 9

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

BTEE 101 Basic Electrical and Electronics Engineering

Objective/s and Expected outcome:

This course is mandatory for all the branches for understanding the basic concepts of Electrical and Electronics Engineering. Students of all branches have to deal with the applications of Electrical Engineering and Electronics Engineering. This course gives a basic knowledge of circuits, transducers, semiconductor devices with which a building of innovative technology can be created. The students are expected to learn and understand the importance and applications of electric and electronics material. This knowledge give them a brief outline of the fundamentals that would be the foundations of todays‟ and tomorrow‟s technology.

Part A (Electrical Engineering)

1. Direct Current (DC) Circuits:

Circuit elements and connected terminology, Kirchoff‟s Laws- Statement and Illustrations, Method of solving circuits by Kirchoff‟s law, Star-Delta Conversion, Computation of resistance at constant temperature, resistance at different temperatures, Ohm‟s Law- Statement, Illustration and Limitation, Units- Work, Power and Energy (Electrical, Thermal and Mechanical). DC Transients for RL and RC series circuits

(7)

2. Alternating Current (AC) Fundamentals:

Generation of alternating electro-motive force EMF, Concept of 3-phase EMF Generation, Peak, Root Mean Square and Average value of alternating current, Phasor representation of alternating quantities, Analysis of AC Circuit Representation of Alternating Quantities in Rectangular and polar forms. Introduction of Resistive, Inductive & Capacitive circuits and their series and parallel combinations. Concept of resonance in series and parallel circuits, Analysis of balanced 03 phase system with star-delta connections.

(7)

3. Magnetic Circuits and Transformer:

Comparison between magnetic and electric circuits, Magnetic effects of electric current, Current carrying conductor in magnetic field, Law of Electromagnetic Induction and its law, Self Inductance, Mutual Inductance, Coupling Coefficient between two magnetically coupled circuits. Single Phase Transformer: Construction, Working principle, Efficiency, Voltage regulation and applications.(7)Page 10

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

10

4. Rotating Electrical Machines:

D.C. machines (motors and generators), Three phase Induction motor, Synchronous machines (motors and generators): construction, working principle, classification and applications.

(7)

Part B (Electronics Engineering)

5. Transducers:

Introduction, working and application of LVDT, Strain Gauge and Thermistor.

Introduction and application of Digital Multimeter.

(7)

6. Semiconductor Devices:

Principle of operation characteristic and application of PN Junction Diode, Rectifiers, Zener Diode, Principle of operation characteristic and application of Bipolar Junction Transistor, Principle of operation and characteristic Field Effect Transistor, Regulated Power Supply.

(7)

7. Digital Electronics:

Binary, Octal and Hexadecimal number System & its arithmetic operations, Logic gates, Introduction of R-S, J-K, D and T Flip Flops & its truth tables.

(6)

Suggested Readings/ Books

1. Basic Electrical and Electronics and Computer Engineering by R Muthusubramanian, S Salivahanan,K A Muraleedharan, Tata McgrawHill

2. A Textbook of Electrical Techology by B.L Theraja.& A.K Theraja, S Chand publishers.

3. Electrical Technology, Edward Hughes, Addisin Wesley Longman Limited.

4. A Course in electrical and electronic Measurements & Instumentation by A.K Sawhney, Dhanpat Rai & Co. Page 11

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

11

EVSC 101 Environmental Science

Objective/s and Expected outcome:

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

1. Measure environmental variables and interpret results

2. Evaluate local, regional and global environmental topics related to resource use and management

3. Propose solutions to environmental problems related to resource use and management

4. Interpret the results of scientific studies of environmental problems

5. Describe threats to global biodiversity, their implications and potential solutions

Part A

1. Introduction: Definition and scope and importance of multidisciplinary nature of environment. Need for public awareness.

(2)

2. Natural Resources: Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

(4)

3. Ecosystems: Concept of Ecosystem, Structure, interrelationship, producers, consumers and decomposers, ecological pyramids-biodiversity and importance. Hot spots of biodiversity

(4)

4. Environmental Pollution: Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control

measure of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster Management : Floods, earthquake, cyclone and landslides.

(5)

PART B

5. Social Issues and the Environment From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention Page 12

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

12

and Control of Pollution) Act. Water (Prevention and control of pollution) Act. Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation Public awareness

(5)

6. Human Population and the Environment, Population growth, variation among

nations. Population explosion – Family Welfare Programme. Environment and human health, Human Rights, Value Education, HIV/AIDS. Women and child Welfare. Role of Information Technology in Environment and human health. Case studies

(4)

Suggested Readings / Books

1. Agarwal, K. C. 2001 Environment Biology, Nidi Publ. Ltd. Bikaner.

2. Jadhav, H & Bhosale, V.M. 1995. Environment Protection and Laws. Himalaya Pub House, Delhi 284p.

3. Rao M. N. & Datta A.K. 1987. Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345 p.

4. Principle of Environment Science by Cunninghan, W.P.

5. Essentials of Environment Science by Joseph.

6. Environment Pollution Control Engineering by Rao, C.S.

7. Perspectives in Environmental Studies by Kaushik, A.

8. Elements of Environment Science & Engineering by Meenakshi.

9. Elements of Environment Engineering by Duggal. Page 13

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

BTPH 102 Engineering Physics Laboratory

1. To study the magnetic field of a circular coil carrying current.

2. To find out polarizability of a dielectric substance.

3. To study the laser beam characteristics like; wave length using diffraction

grating aperture & divergence.

4. To study laser interference using Michelson‟s Interferometer.

5. Study of diffraction using laser beam and thus to determine the grating element.

6. To determine numerical aperture of an optical fibre.

7. To determine attenuation & propagation losses in optical fibres.

8. To find out the frequency of AC mains using electric-vibrator.

9. To find the refractive index of a material using spectrometer.

10. To find the refractive index of a liquid.

11. To study B-H curve using CRO.

12. To find the velocity of ultrasound in liquid.

13. To determine the grain size of a material using optical microscope.

Note: Each student is required to perform at least ten experiments

Suggested Readings / Books

1. Practical Physics, C.L. Arora, S. Chand & Co.

2. Practical Physics, R.S. Sirohi, Wiley Eastern. Page 14

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

14

BTHU 102 Communication Skills Laboratory

Lab Exercises

Listening and Speaking

The audio CD accompanying S.P. Dhanavel‟s book shall be played in the lab to get the students familiar with the standard spoken English. The students must develop a high degree of understanding of spoken material as used in academic and professional environment. The teacher shall help them in the following:

a) With the accent of the speaker if it is unfamiliar to them.

b) The Standard English sounds and pronunciation of words.

c) With the topical vocabulary and the idiomatic expressions which are generally part of colloquial speech.

d) With the implied relationships in larger texts, if they are not stated explicitly.

In addition to the above, extended listening sessions shall be arranged to promote speaking activities among students. For this purpose, a set of twin books K. Sadanand and S. Punitha Spoken English Part I and II, A Foundation Course (with audio CD), Orient Blackswan, is prescribed for use. The teachers shall play the CDs selectively in the lab and involve the students in the practice work based on them. While taking up lessons, the teacher must promote the use of dictionaries for correct pronunciation and give ample practice on word stress and weak forms.

The students are also supposed to supplement their listening practice by regularly viewing news/knowledge channels on the TV or lecture videos on the internet.

At the end of a session, a good speaker must:

a) Be able to produce long turns without much hesitation in an accent that is understood all

around.

b) Have ready access to a large lexis and conventional expressions to speak fluently on a variety of topics.

c) Have a knack for structured conversation or talk to make his transitions clear and natural to his listeners.

The teacher may use following different classroom techniques to give practice and monitor the progress of the students:

role play

question-answer

discussion

presentation of papers

seminars Page 15

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

15

BTEE 102 Basic Electrical and Electronics Engineering Laboratory

List of Experiments to be performed

1. To verify Ohm‟s Law and its limitations.

2. To verify Kirchoff‟s Laws.

3. To measure the resistance and inductance of a coil by ammeter-voltmeter method.

4. To find voltage-current relationship in a R-L series circuit and to determine the power factor of the circuit.

5. To verify the voltage and current relations in star and delta connected systems.

6. To measure power and power factor in a single- phase AC circuit.

7. To verify series and parallel resonance in AC circuits.

8. To observe the B-H loop of ferromagnetic core material on CRO.

9. To use a bridge rectifier for full- wave rectification of AC supply and to determine the relationship between RMS and average values of the rectified voltage.

10. To measure the minimum operating voltage, current drawn, power consumed, and the power factor of a fluorescent tube light.

11. To verify the working of a). Thermocouple b). Strain Gauge c). LVDT.

12. To verify the rating of compact fluorescent lamp (CFL).

13. To obtain the characteristics of a P-N junction diode.

14. To verify the truth table of logic gates.

15. To connect the following ,measuring instruments to measure current, voltage and power in AC/DC circuits:

i. Moving Coil Instruments

ii. Moving Iron Instruments

iii. Dynamometer Instruments

iv. Multimeter- both Digital and Analog Type

16. To obtain the characteristics of a transistor under common base (CB) and common emitter (CE) configuration.

17. To perform open- and short circuit tests on a single phase transformer and calculate its efficiency

18. To start and reverse the direction of rotation of a

i. DC motor

ii. Induction motor

Note: Each student is required to perform at least ten experiments

Suggested Readings / Books

1. S.K. Bhattacharya and R.K. Rastogi, Experiments in Electrical Engineering, New Age International Publishers Ltd., New Delhi.

2. D.R. Kohli and S.K. Jain, Experiments in Electrical Machines. Page 16

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

16

BTME 101 Manufacturing Practice

PART A

1. Carpentry and Pattern Making: Various types of timber and practice boards, defects in timber, seasoning of wood; tools, wood operation and various joints; exercises involving use of important carpentry tools to practice various operations and making joints.

2. Foundry Shop: Introduction to molding materials; moulds; use of cores; melting furnaces; tools and equipment used in foundry shops; firing of a cupola furnace; exercises involving preparation of small sand moulds and castings.

3. Forging Practice: Introduction to forging tools; equipments and operations; forgability of metals; exercises on simple smithy; forging exercises.

4. Machine Shop: Machines, Grinders etc; cutting tools and operations; exercises involving awareness.

PART B

5. Welding Shop: Introduction to different welding methods; welding equipment; electrodes; welding joints; welding defects; exercises involving use of gas/electric arc welding.

6. Electrical and Electronics Shop: Introduction to electrical wiring; preparation of PCBs involving soldering applied to electrical and electronic applications; exercises preparation of PCBs involving soldering applied to electrical and electronic applications.

7. Sheet Metal: Shop development of surfaces of various objects; sheet metal forming and joining operations, joints, soldering and brazing; exercises involving use of sheet metal forming operations for small joints.

8. Fitting Shop: Introduction of fitting practice and tools used in fitting shop; exercise involving marking, cutting, fitting practice (Right Angles), male-Female mating parts practice, trapping practice.

Suggested Readings/ Books

1. Raghuwanshi, B.S. ; A course in Workshop technology, Vol 1 & II, Dhanpat Rai & Sons , New Delhi.

2. Jain, R.K.; Production Technology, Khanna Publishers, New Delhi.

3. Singh, S, ; Manufacturing Practice, S.K. Kataria & Sons, New Delhi Page 17

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

17

BTCH101 Engineering Chemistry

Objective/s and Expected outcome:

The objective of the Engineering Chemistry is to acquaint the student with the basic phenomenon/concepts of chemistry, the student face during course of their study in the industry and Engineering field. Some new topics have been introduced to the syllabus for the development of the right attitudes by the engineering students to cope up with the continuous flow of new technology. The student with the knowledge of the basic chemistry, will understand and explain scientifically the various chemistry related problems in the industry/engineering field. The student will able to understand the new developments and breakthroughs efficiently in engineering and technology. The introduction of the new topics will make the engineering student upgraded with the new technologies.

PART A

1. Spectroscopy and its Applications: An introduction

UV/Visible Spectroscopy: Selection rules; Line widths and intensity of spectral lines; Principle and instrumentation; Electronic Transitions; Chromophores & auxochromes; Factors affecting λMax & intensity of spectral lines; Franck-Condon principle; Applications.

IR Spectroscopy: Principle and instrumentation; Vibrational frequency;

Fundamental modes of vibrations and types; Anharmonics; Factors affecting vibrational frequency; Applications.

NMR Spectroscopy: Principle & instrumentation; Chemical shift; Spin-Spin Splitting; High resolution NMR spectrum (PMR only).

(7)

2. Photochemistry:

Introduction; Photo-physical & photochemical processes; Light sources in photochemistry; Beer-Lambert Law; Laws of Photochemistry; Quantum yield (primary and overall); Primary and secondary photochemical reactions; Jablonski diagram; Semiconductor photochemistry, Photovoltaic cells, Introduction to optical sensors, Introduction to supra-molecular photochemistry.

(5)

3. Water and its Treatment:

Boiler feed water: Specification, Scales and sludge fermentation; Priming & foaming; Different methods of the water purifications and softening; Page 18

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

18

Desalination of water; Water for domestic use: Specification; Disinfection of

water.

(4)

4. Green Chemistry and its Applications:

Introductory overview - Definition and concepts of Green chemistry; Emergence of Green chemistry; Twelve principles of Green Chemistry with emphasis on the use of alternative feedstock (bio-fuels); Use of innocuous reagents in natural processes; Alternative solvents; Design of the safer chemicals; Designing alternative reaction methodology. Microwave and ultrasonic radiation in Green synthesis - Minimizing energy consumption. (4)

PART B

5. Corrosion and its Prevention:

Introduction; Different types of corrosion - Wet and Dry corrosion; Different types of surface films; Mechanisms of wet corrosion; Galvanic corrosion; Galvanic Series; Concentration cell corrosion and differential aeration corrosion; Soil and microbial corrosions; waterline, stress corrosions; Various methods of corrosion control.

(5)

6. Polymers and Reinforced Composites:

Introduction; Functionality; Types of polymerization; Specific features of polymers; Structures - regularity and irregularity; Tacticity of polymers; Average molecular weights and size; Determination of molecular weight by number average method; Effect of molecular weight on the properties of polymers; Introduction to polymer reinforced composite.

(5)

7. Nanochemistry:

Introduction; Materials self-assembly; Moloecular vs. materials self-assembly; Self-assembling materials; Two dimensional assemblies; Mesoscale self assembly; Coercing colloids; Nanocrystals; Superamolecular structures; Nanoscale materials; Future perspectives.

(5)

8. Petrochemicals:

Introduction; First, second & third generation petrochemicals; Primary Raw Materials for Petrochemicals. Page 19

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

19

Natural gas: Natural gas treatment processes; Natural gas liquids; Properties of natural gas; Crude oil: Composition of crude oil- Hydrocarbon compounds; Non-hydrocarbon compounds; Metallic Compounds, Crude oil classification; Physical separation processes; Conversion processes; Production of ethylene and propylene.

(5)

Suggested Readings / Books

1. William Kemp, Organic Spectroscopy, Palgrave Foundations, 1991.

2. D. A. Skoog, F. J. Holler and A. N. Timothy, Principle of Instrumental Analysis,

5th Edition., Saunders College Publishing, Philadelphia, 1998.

3. G. W. Castellan, Physical Chemistry, Narosa, 3rd Edition, 1995, reprint 2004.

4. C. P. Poole, Jr., F. J. Owens, Introduction to Nanotechnology, Wiley Interscience, 2003.

5. L.E.Foster, Nanotechnology, Science Innovation & Opportunity, Pearson Education, 2007.

6. M. Lancaster, Green Chemistry an Introductory Text, Royal Society of Chemistry, Cambridge, UK, 1st edition, 2010.

7. Sami Matar, Lewis F. Hatch, Chemistry of Petrochemical Processes, Second Edition, Gulf Publishing company, Houston, Texas, 2000.

8. Jones, Denny, Principles and Prevention of Corrosion, Upper Saddle River, New Jersey: Prentice Hall, 2nd edition, 1996.

9. Nicholas J Turro, Modern Molecular Photochemistry, University Science Books, Sausalito, California 2010.

10. Mohamed Belgacem, Alessandro Gandini, Monomers, Polymers and Composites from Renewable Resources, ELSEVIER, 2008. Page 20

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

BTAM102 Engineering Mathematics-II

Objective/s and Expected outcome:

The learning objectives of core mathematics courses can be put into three categories:

Content Objectives: Students should learn fundamental mathematical concepts and how to apply them. Skill Objectives: Students should learn critical thinking, modeling/problem solving and effective uses of technology. Communication Objectives: Students should learn how to read mathematics and use it to communicate knowledge. The students are expected to understand the fundamentals of the mathematics to apply while designing technology and creating innovations.

PART A

1. Ordinary Differential Equations of first order

Exact Differential equations, Equations reducible to exact form by integrating factors; Equations of the first order and higher degree. Clairaut's equation. Leibniz's linear and Bernoulli's equation

(7)

2. Linear Ordinary Differential Equations of second & higher order

Solution of linear Ordinary Differential Equations of second and higher order; methods of finding complementary functions and particular integrals. Special methods for finding particular integrals: Method of variation of parameters, Operator method. Cauchy's homogeneous and Legendre's linear equation, Simultaneous linear equations with constant coefficients.

(7)

3. Applications of Ordinary Differential Equations

Applications to electric R-L-C circuits, Deflection of beams, Simple harmonic

motion, Simple population model.

(7)Page 21

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

21

PART B

4. Linear Algebra

Rank of a matrix, Elementary transfonnations, Linear independence and dependence of vectors, Gauss-Jordan method to find inverse of a matrix, reduction to normal form, Consistency and solution of linear algebraic equations, Linear transformations, Orthogonal transformations, Eigen values, Eigen vectors, Cayley-Hamilton Theorem, Reduction to diagonal form, orthogonal, unitary, Hermitian and similar matrices.

(7)

5. Infinite Series

Convergence and divergence of series, Tests of convergence (without proofs): Comparison test, Integral test, Ratio test, Rabee's test, Logarithmic test, Cauchy's root test and Gauss test. Convergence and absolute convergence of alternating series

(7)

6. Complex Numbers and elementary functions of complex variable

De-Moivre's theorem and its applications. Real and Imaginary parts of exponential, logarithmic, circular, inverse circular, hyperbolic, inverse hyperbolic functions of complex variables. Summation of trigonometric series. (C+iS method)

(7)

Suggested Readings / Books:

1. Kreyszig,E., Advanced Engineering Mathematics, Eighth edition, John Wiley.

2. Michael D. Greenberg., Advanced Engineering Mathematics, Second Edition, Pearson Education.

3. Peter. V. O'Nil, Advanced Engineering Mathematics, Wadsworth- Publishing Company.

4. Jain, R.K. and Iyengar, S.R.K., Advanced Engineering Mathematics, Narosa Publishing House, New Delhi.

5. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, Delhi.

6. Pipes, L.A. and Harvill, L.R., Applied Mathematics for Engineers and Physicists, McGraw Hill

7. Taneja, H. C., Engineering Mathematics, Volume-I & Volume-II, 1. K. Publisher.

8. Babu Ram, Advance Engineering Mathematics, Pearson Education.

9. Bindra, J. S., Applied Mathematics, Volume-II, Kataria Publications. Page 22

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

22

BTME 101 Elements of Mechanical Engineering

Objective and Expected Outcome:

In the vast spectrum of Mechanical Engineering, this subject gives a very primitive but general information finding vide application in day to day life with emphasis upon the principles and fundamentals involved in the inter-conversion of thermal energy into mechanical energy and vice versa, viz. all Automobile, Air-Craft, Generator and other stationary Heat Engines besides cooling machinery like Refrigerators, Air-Conditioners and water-coolers etc. The subject also offers a birds eye-view to all students about the common engineering materials finding vide application in Mech. Engg. Industry and about their strength and other related vital aspects. Since every student of engineering is already exposed to all afore-said machinery, he/she would feel very much self-satisfied and self-confident after learning the basic intricacies and whys and hows related with the fundamentals of the aforesaid machinery.

PART-A

1. Basic Concepts of Thermodynamics

Definition of thermodynamic: Need to study thermodynamics; Application areas of thermodynamic; Difference between Microscopic (or, Statistical) thermodynamics and Macroscopic(or, Classical) thermodynamics; Brief concept of continuum; Thermodynamic System : definition, types (Open, Closed and Isolated) and their examples; Thermodynamic System Boundary : definition, types and their examples; Surroundings;

Control(fixed) mass and Control Volume concept and their example ; Thermodynamic State; Thermodynamic Property: definition, types citing their examples; condition for any quantity to be a property; State postulate; Thermodynamic equilibrium (which includes Thermal, Mechanical and Chemical equilibrium etc.) and its criterion; Thermodynamic path; Thermodynamic process: definition, concepts of reversible process, quasi-static (or, quasi-equilibrium) process, irreversible process, conditions for reversibility and how these are met with, non-flow processes and flow processes, method of representation of reversible and irreversible process on property diagrams; Cyclic process; Thermodynamic Cycle: definition and its Page 23

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

23

concept; Energy and its forms (microscopic and macroscopic); Physical insight to internal energy; Energy transfer across system boundary i.e. transient energies (heat and work); Difference between heat and work; Sign conventions for heat and work interactions; heat and work as path functions; Equality of Temperature and Zeroth law of Thermodynamics.

(8)

2. First Law of Thermodynamics and its applications

Definition, essence and corollaries or consequences of first law of Thermodynamics; Expressions for First law of Thermodynamics for a control mass undergoing a Cycle and for process (i.e., a change in state of a control mass) ; Concept of Enthalpy and total energy and differentiation between the two – a thermodynamic property; Compressible and incompressible substances, Specific heats, Difference between Internal Energy and Enthalpy of compressible and incompressible substances; Representation of first law of thermodynamics as rate equation; Analysis of non-flow/ flow process for a control mass undergoing constant volume, constant pressure, constant temperature, adiabatic and polytropic processes; Free Expansion Process and its examples, its representation on Property diagram; Review of concepts of control volume; Expressions of first law of thermodynamics for a control volume (i.e. open system) ; Steady State Steady Flow process and its examples; First law analysis of Steady State Flow process e.g. isochoric, isobaric, isothermal, isentropic and polytropic process; Throttling process and its applications; Flow energy or inertial energy of flowing fluids or, Energy transport by mass; Application of Steady State Flow Energy Equation to various engineering devices.

(12)

3. Second Law of Thermodynamics

Limitations of first law of thermodynamics; and how 2nd law is fully able to explain away and thus overcome those shortcomings of Ist law; Thermal Reservoirs, source and sink (Low temperature and high temperatures); Heat Engine, Heat Pump and Refrigerator: definitions, working, efficiency/performance and their real life examples. Justification as to why

the actual efficiency of Heat Pump and Refrigerator shall also be ≤ 100% though on the face of it seems to be more than 100%; Various statements of Second Law of Thermodynamics and their equivalence; Philosophy of Page 24

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

24

Carnot cycle and its consequences viz. how each of the individual four processes constituting the cycle contribute in optimizing the output and efficiency of the cycle; Carnot Engine, Carnot Refrigerator and Carnot Heat Pump: definitions, working, efficiency/performance and Limitations of the cycle; Carnot theorem for heat engines, refrigerators and heat pumps; derivation of Carnot efficiency/COP (which seems to be more than 100%); Thermodynamic Temperature Scale; Clausius theorem and Inequality; Philosophy and concept of entropy; Entropy changes during various processes; Temperature - Entropy Chart and representation of various processes on it; Principle of Increase of Entropy; Applications of Entropy Principle; Quality of Energy viz. high and low grade energies; Degradation of Energy; Third Law of Thermodynamics.

(18)

PART-B

4. Gas Power Cycles

Introduction; Concept and philosophy of Air Standard Cycle alongwith associated assumptions and advantages; Air Standard Efficiency; Nomenclature of reciprocating piston-cylinder arrangement with basic definitions such as swept volume, clearance volume, compression ratio, mean effective pressure etc; Otto Cycle (or constant volume heat addition cycle), Diesel cycle (or constant pressure heat addition cycle) and Dual cycle (Mixed or Composite or Limited Pressure cycle) with their representation on P-V and T-S charts, their Air-standard (thermal) Efficiencies; Comparison of Otto, Diesel and Dual cycle under some defined similar parametric conditions; Introduction to heat engines; Merits of I.C. Engines and their important applications, Classification and constructional features of I.C. Engines; working of two stroke and four stroke Petrol and Diesel engines and their comparison.

(12)

5. Mechanics of Solids

Introduction, Stress, Types of stresses, Hook‟s Law, Strain, Longitudinal and lateral strain, Poison‟s ratio, Stress-strain diagram for ductile and brittle materials, Shear Stress and Shear Strain, Factor of Safety, Principle of Super-position, Strain energy and resilience, Sudden and impact load, Page 25

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

25

Extension of a tapered bar, Extension of a bar due to self-weight, bar of uniform strength, Stress in bars, Thermal Stresses, Elastic constants and their significance, relation between elastic constants, Young‟s modulus of elasticity, Modulus of Rigidity and Bulk modulus.

(4)

6. Engineering Materials

Materials and Civilization, Materials and Engineering, Classification of Engineering Materials, Significance of various Mechanical Properties of Materials: e.g., elasticity, plasticity, strength, ductility, brittleness, malleability, toughness, resilience, hardness, machinability, formability, weldability. Properties, Composition, and Industrial Applications of materials: metals (ferrous- cast iron, tool steels, stainless steels and non ferrous-Aluminium, brass, bronze), polymers (natural and synthetic , thermoplastic and thermosetting), ceramics (glass, optical fibre glass, cements), Composites(fibre reinforced, metal matrix) , Smart materials (piezoelectric, shape memory, thermochromic, photochromic, magnetorheological), Conductors, Semi-conductors and Insulators, Organic and Inorganic materials. Selection of materials for engineering applications.

(6)

Suggested Readings / Books

1. Nag P.K., Engineering Thermodynamics, Tata McGraw Hill.

2. Yadav R., Thermodynamics and Heat Engines, Central Publishing House,

Allahabad

3. Rogers G. and Mayhew Y., Engineering Thermodynamics, Pearson

Education.

4. Cengel Y.A. and Boles M.A., Thermodynamics – An Engineering Approach,

Tata McGraw Hill.

5. Rao Y.V.C., An Introduction to Thermodynamics, New Age International (P)

Limited Publishers.

6. Spalding D. B., Cole E. H., Engineering thermodynamics, ELBS series

7. Gere J.M., Mechanics of Materials, Cengage Learning.

8. Bedi D.S., Element of Mechanical Engineering, Khanna Publishers New Delhi

9. Donald R. Askeland, Pradeep P. Phule, Essentials of materials Science and

Engineering, Cenage Learning Page 26

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

26

BTCS 101 Fundamentals of Computer Programming and IT

Objective/s and Expected outcome:

To familiarize the students of all branches in engineering with computer organization, operating systems, problem solving and programming in C++. After the students have successfully completed the course, they shall have sufficient knowledge of the

basic computer operations and various programming techniques especially in C++.

PART A (Fundamentals of Computer and IT) (25%)

1. Introduction to Computers

Define a Computer System, Block diagram of a Computer System and its working, associated peripherals, memories, RAM, ROM, secondary storage devices, Computer Software and Hardware.

(2)

2. Working Knowledge of Computer System

Introduction to the operating system, its functions and types, working knowledge of GUI based operating system, introduction to word processors and its features, creating, editing, printing and saving documents, spell check, mail merge, creating power point presentations, creating spreadsheets and simple graphs, evolution of Internet and its applications and services.

(3)

3. Problem Solving & Program Planning

Need for problem solving and planning a program; program design tools – algorithms, flow charts, and pseudocode; illustrative examples.

(2)

PART B (Basics of Programming Using C++) (75%)

4. Overview of C++ Language

Introduction to C++ language, structure of a C++ program, concepts of compiling and linking, IDE and its features; Basic terminology - Character set, tokens, identifiers, keywords, fundamental data types, literal and symbolic constants, declaring variables, initializing variables, type modifiers.

(3) Page 27

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

27

5. Operators and expressions

Operators in C++, precedence and associativity of operators, expressions and their evaluation, type conversions.

(2)

6. Beginning with C++ program

Input/output using extraction (>>) and insertion (<<) operators, writing simple C++ programs, comments in C++, stages of program execution.

(4)

7. Control Structures

Decision making statements: if, nested if, if – else. Else if ladder, switch,

Loops and iteration: while loop, for loop, do – while loop, nesting of loops, break statement, continue statement, goto statement, use of control structures through illustrative programming examples.

(4)

8. Functions

Advantages of using functions, structure of a function, declaring and defining functions, return statement, formal and actual arguments, const argument,

default arguments, concept of reference variable, call by value, call by reference, library functions, recursion, storage classes. Use of functions through illustrative programming examples.

(4)

9. Arrays and Strings

Declaration of arrays, initialization of array, accessing elements of array, I/O of arrays, passing arrays as arguments to a function, multidimensional arrays. String as array of characters, initializing string variables, I / O of strings, string manipulation functions (strlen, strcat, strcpy, strcmp), passing strings to a function. Use of arrays and strings through illustrative programming examples.

(4)

10. Concepts of Object Oriented Programming

Introduction to Classes, Objects, Data abstraction, Data encapsulation, inheritance and polymorphis.

(2) Page 28

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

11. Classes and Objects

Defining classes and declaring objects, public and private keywords,

constructors and destructors, defining member functions inside and outside of a class, accessing members of a class, friend function. Use of classes and objects through illustrative programming examples.

(4)

12. Basics of File Handling

Opening, reading, and writing of files, error handling during files operation. (2)

Suggested Readings/ Books

1. E. Balagurusamy, Object-Oriented Programming with C++, Tata McGraw Hill.

2. P. K. Sinha and Priti Sinha, Computer Fundamentals, BPB Publications.

3. Lafore R., Object Oriented Programming in C++, Waite Group.

4. Bjarne Stroustrup, The C++ Programming Language, Addison Wesley.

5. Lippman F. B, C++ Primer, Addison Wesley.

6. R. S. Salaria, Computer Concepts and Programming in C++, Salaria Publishing House.

7. Gurvinder Singh, Krishan Saluja, Fundamentals of Computer Programming & IT, Kalyani Publishers.

8. R. S. Salaria, Fundamentals of Computers, Salaria Publishing House.

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

HVPE 101 Human Values & Professional Ethics

Objective/s and Expected outcome:

To help the students to discriminate between valuable and superficial in the life.

To help develop the critical ability to distinguish between essence and form, or between what is of value and what is superficial, in life - this ability is to be developed not for a narrow area or field of study, but for everyday situations in life, covering the widest possible canvas. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. It is not sufficient to develop the discrimination ability, it is important to act on such discrimination in a given situation. Knowingly or unknowingly, our education system has focused on the skill aspects (learning and doing) - it concentrates on providing to its students the skills to do things. In other words, it concentrates on providing “How to do” things. The aspects of understanding “What to do” or “Why something should be done” is assumed. No significant cogent material on understanding is included as a part of the curriculum. A result of this is the production of graduates who tend to join into a blind race for wealth, position and jobs. Often it leads to misuse of the skills; and confusion and wealth that breeds chaos in family, problems in society, and imbalance in nature. This course is an effort to fulfill our responsibility to provide our students this significant input about understanding. This course encourages students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and the superficial in real situations in their life. It has been experimented at IIITH, IITK and UPTU on a large scale with significant results.

PART A

1. Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, content and process for Value Education.

Self Exploration–what is it?- its content and process; „Natural Acceptance" and Experiential Validation- as the mechanism for self exploration.

Continuous Happiness and Prosperity- A look at basic Human Aspirations Page 30

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

30

Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority

Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

Method to fulfill the above human aspirations: understanding and living in harmony at various levels

(6)

2. Understanding Harmony in the Human Being - Harmony in Myself!

Understanding human being as a co-existence of the sentient „I" and the material „Body"

Understanding the needs of Self („I") and „Body" - Sukh and Suvidha

Understanding the Body as an instrument of „I" (I being the doer, seer and enjoyer)

Understanding the characteristics and activities of „I" and harmony in „I"

Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail

Programs to ensure Sanyam and Swasthya

(6)

3. Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction

Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship

Understanding the meaning of Vishwas; Difference between intention and competence

Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship

Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals

Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family!

(6)Page 31

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

31

PART B

4. Understanding Harmony in the Nature and Existence - Whole existence

as Co-existence

Understanding the harmony in the Nature

Interconnectedness and mutual fulfillment among the four orders of

nature- recyclability and self-regulation in nature

Understanding Existence as Co-existence (Sah-astitva) of mutually

interacting units in all-pervasive space

Holistic perception of harmony at all levels of existence

(4)

5. Implications of the above Holistic Understanding of Harmony on

Professional Ethics

Natural acceptance of human values

Definitiveness of Ethical Human Conduct

Basis for Humanistic Education, Humanistic Constitution and Humanistic

Universal Order

Competence in professional ethics:

o Ability to utilize the professional competence for augmenting universal

human order

o Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems

o Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems

Strategy for transition from the present state to Universal Human Order:

o At the level of individual: as socially and ecologically responsible engineers, technologists and managers

o At the level of society: as mutually enriching institutions and organizations

(6)Page 32

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

32

Suggested Readings / Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.

2. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and

HarperCollins, USA

3. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.

4. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.

5. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991

6. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.

7. A.N. Tripathy, 2003, Human Values, New Age International Publishers

8. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.

9. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.

10. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press

11. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd

12. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.

13. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008. Page 33

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

33

BTCH 102 Engineering Chemistry Laboratory

1. Analysis of Effluents

Determination of water by EDTA method.

Determination of H2O by dissolved oxygen analyzer.

Determination of turbidity by Nephelometer

Determination of Residual Chlorine.

2. Analysis of Fuels and Lubricants

Determination of Moisture, Volatile and ash content by proximate analysis.

Determination of Flash & Fire point by Abee‟s Apparatus

Determination of the viscosity.

Determination of Acid Value and Aniline point of oil

Determination of refractive index for oils.

3. Instrumental Analysis

Determination λ-max by spectrophotometer and determination of unknown conc of

binary mixture of two liquids.

Determination of the surface tension by stalagmometer.

Determination of the concentration of a solution conductometerically.

Determination of the strength of a solution pH meterically.

Distinction between acid, ester, ketone using IR spectrophotometer.

Determination of bathochromic shifts, hypsochromic and hyperchromic,

hypochromic shift of benzene and its derivatives

4. Chromatography

Determination of Rf value of amino acid by TLC and identification of the amino acid present.

Separation of metallic ions by paper chromatography.

Separation of Ions by using complexing agents

Separation of plant pigments, Chlorophyll and carotenoids by column chromatography.

Determination of the ion exchange capacity of the given ion exchanger.

Separation of ions by ion-exchange method.

5. Synthesis & Green Chemistry experiments

Preparation of a polymer phenol/urea formaldehyde resin or hexamethylenediamine adipic acid polymer and determination of carbonyl value or acid value.

Preparation of aspirin.

Preparation of ethyl-2-cyano-3-(4‟-methoxyphenyl)-propeonate (Microwave assisted reaction)

Base catalyzed aldol condensation by Green Methodology

Acetylation of primary amines using ecofriendly method.

Note: Each student is required to perform two experiments from each of the 5 titles (presented bold) depending on his/her Branch and Aptitude.

Suggested Readings / Books

1. Vogel A-I, Quantitative Inorganic Analysis, Oxford ELBS

2. Vogel A-I, Quantitative Organic Analysis, Oxford ELBS

3. dst.gov.in/green-chem.pdf (monograph of green chemistry laboratory

experiments) Page 34

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

34

BTME 102 Engineering Drawing

Objective and Expected Outcome:

Main objective of the Engineering Drawing is to introduce the students to visual science in the form of technical graphics. General instructions related to Theory of Orthographic Projection of points, lines, planes and solids as per the BIS codes prevalent to drawing practice will be introduced initially. Section of solids, intersection and development of surfaces, isometric projection and orthographic projection of simple solids/blocks will further upgrade the basic understanding and visualization of geometrical objects and to certain extent the machine parts. Computer graphics will enable the students to strengthen the understanding through hands on training on Autocad software wherein they will be introduced to a number of assignments as mentioned in the said course.

PART A

1. Introduction

Engineering Drawing/Engineering Graphics/Technical Drawing – a Visual Science. Types of Engineering Drawing, Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of

lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning, Concepts of scale in drawing, Types of scales. Basic Definition of geometrical objects: Points, lines, planes and solids.

2. Theory of Projections

Relevance of projection, Type of projections, Perspective, Orthographic, Axonometric and their basic principles, System of orthographic projection: in reference to quadrants and octants, illustration through simple problems of projection.

3. Projection of Points

Projection of points in quadrants and octants. Projection of point on Auxiliary planes.

4. Projection of Lines

Parallel to both H P and V P, Parallel to one and inclined to other, and inclined to both, contained in profile plane. True length and angle orientation of straight line: rotation method and auxiliary plane method. Distance between two non-intersecting lines, and trace of line.

5. Projection of PlanesPage 35

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

Difference between plane and lamina. Projection of lamina Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, and Lamina oblique to three reference planes.

Application of auxiliary planes, and trace of planes.

6. Projection of Solids

Definition of solids, types of solids, and elements of solids. Projection of solids in first or third quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation and auxiliary plane method to draw the projections.

PART B

7. Section of Solids

Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

8. Intersection of Surfaces/Solids

Purpose of intersection of surfaces, Intersection between the two cylinder, two prisms, prism and pyramid, pyramid and pyramid, cylinder and prism, cone and cylinder, sphere and cylinder etc., use of cutting plane and line method.

9. Development of Surface

Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

10. Isometric Projection

Classification of pictorial views, Basic Principle of Isometric projection,

Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism, pyramid and cylinder, and assignments on isometric projection of simple machine parts.

11. Orthographic Projection

Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

Suggested Readings / Books Page 36

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

1. Narayana K L and Kanaiah P, “Engineering Graphics”, Tata McGraw Hill Publishing Company Limited, New Delhi.

2. Gill P S, “Engineering Graphics and Drafting”, Katria and Sons, Delhi.

3. Bhat N D, “Elementary Engineering Drawing-Plane and solid Geometry”, Chartotar Publishing House, Anand.

4. Luzzadde Warren J, “Fundamentals of Engineering Drawing”, Prentice Hall of India Private Limited, New Delhi.

5. Bertoline G R , Wiebe E N, Miler G L L & Mother J L, “Technical Graphics Communication”, Irwin McGraw Hill, New York.

BTCS102 Fundamentals of Computer Programming and IT

1. Familiarization with the Computer System:

To explain the part of the computer system such as system unit, input devices, output devices connected to the computer.

To explore the outside view of the system unit that includes the panels on front and ports at the rear

To explore the inside view of the system unit that includes the motherboard, processor, expansion slots, various add-on cards, storage devices, power supply, fans.

To understand the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.

To introduce the graphical user interface (desktop) of Windows operating system

o to explain the various elements of the desktop such as taskbar, icons (My Computer, Recycle Bin, etc.), short cuts, notification area.

o to configure the desktop that include selecting the wall paper, selecting the screen saver with or without password protection, selecting the screen resolution and color quality.

2. Navigating with Window Explorer:

To navigate with the drives

To create new folders

To move folders from one drive to another drive Page 37

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

37

To move files from one folder to another folder

To search files and folders

To share files and folders

To view and/or change the attributes of the files and folders

3. Working with Control Panel:

To work with date and time

To create new user accounts

To install new hardware and configuring existing hardware

To install new software or remove existing installed software

To configure network connections

To manage security profile

4. Miscellaneous Features:

To work at the command prompt

To open an application, folder, document or internet resource from the Run

command

To initialize storage media (formatting)

To understand the menace of viruses

To understand the working of virus guards and antivirus software

5. Exploring the Internet:

To understand the working of the internet that include the use of protocols,

domains, IP addresses, URLs, web browsers, web servers, mail-servers, etc.

To create email-account, sending mails, receiving mails, sending files as

attachments, etc.

To login to a remote computer

To search information using search engines

6. Microsoft Word:

To familiarize with parts of Word window

To create and save a document

To set page settings, create headers and footers

To edit a document and resave it

To use copy, cut and paste features

To use various formatting features such as bold face, italicize, underline,

subscript, superscript, line spacing, etc. Page 38

To use spelling and grammar checking feature

To preview print a document

7. Microsoft Word continued:

To create a table with specified rows and columns

To enter data in a table

To select a table, a row, a column or a cell

To inset new row and/or a column

To delete a row and/or a column

To split and merge a row, column or a cell

To understand the mail-merge and to use mail merge feature of MS-Word

8. Microsoft Excel:

To familiarize with parts of Excel window

To create and save a workbook with single and/or multiple worksheets

To edit and format text as well numbers

To apply operations on range of cells using built-in formulae

To preview and print a worksheet

9. Microsoft Excel continued:

To insert new row and/or column in a worksheet

To delete a row and/or column in a worksheet

To create a variety of charts

To import and export data to or from worksheet

10. Microsoft PowerPoint:

To familiarize with parts of PowerPoint window

To create and save a new presentation

To apply design templates to a presentation

To insert, edit and delete a slide

To use different views of slides

To use slide show from beginning or from the current slide

To preview and print a presentation

11. Microsoft PowerPoint continued:

To check spellings in a presentation

To add clip art and pictures in a slide Page 39

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

39

To add chart, diagram and table in a slide

To set animation for a selected slide and/or for entire presentation

To create slide master and title master

To create a custom show

12. Write a program to find the nature of the roots as well as value of the roots. However, in case of imaginary roots, find the real part and imaginary part separately.

13. Write a program, which takes two integer operands and one operator form user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use switch statement).For example, the input should be in the form: 5 + 3 the output should comes Result = 8

14. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first n terms of the

sequence. For example, for n = 8, the output should be 0 1 1 2 3 5 8

13

15. Write a program to print all the prime numbers between m and n, where the value of m and n is supplied by the user.

16. The number such as 1991, is a palindrome because it is same number when read forward or backward. Write a program to check whether the given number is palindrome or not.

17. A positive integer number IJK is said to be well-ordered if I<J<K. For example, number 138 is called well-ordered because the digits in the number (1, 3, 8) increase from left to right, i.e., 1 < 3 < 8. Number 365 is not well-ordered because 6 is larger than 5. Write a program that will find and display all possible three digit well-ordered numbers. The program should also display the total number of three digit well-ordered numbers found.

18. Write a function to computer the highest common factor of integer numbers m and n. Use this function to find the highest common factor of integer numbers a and b.

19. Given the marks (out of 100) obtained by each student in a test of a class with n students. Write a program to obtain the following information:

(a) minimum and maximum marks score Page 40

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

40

(b) average score of the class, and

(c) number of students whose score is greater than class's average score

20. Write a program to multiply matrix Am×n by Bp×q, given that n = p.

21. Write a program to sort a list of n integer numbers in descending order using bubble sort method.

22. Create a class named Student with the appropriate data members and member functions to generate output comprising student's admission no., name, marks in five subjects and the %age of marks obtained. Write a program to use the Student class.

23. Create a class named ComplexNumber with the appropriate data members and constructors. Include member functions (defined inside the class) to perform the following operations:

(a) Inputting a complex number

(b) Outputting a complex number

(c) Arithmetic operations on two complex numbers

Write an appropriate program to demonstrate use of the ComplexNumber class.

24. Create a class named Height with feet and inches as its data members. Also include appropriate constructors (and destructor, if required). Include member functions (defined outside the class) to perform the following operations:

(a) Inputting a height of a person

(b) Displaying a height of a person

(c) To get height in inches

(d) To compare two heights

Write an appropriate program to demonstrate use of the Height class.

Note: Students are required to prepare a file containing lab exercises based on programming only, where as the oral examination will from the entire syllabus. Page 41

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

41

BTME 103 Engineering Computer Graphics Laboratory

Objective/s and Expected outcome:

Engineering Computer Graphics deals with the use of Software like Solid Works to fully explore and understand the features of simple geometrical object, Machine parts and their assembly. The course content comprises of a number of exercises to be individually carried out on computers.

➢ Introduction to Solid Works:

Main Pull down Menu, Feature Manager Tree, View Orientation, View and Display Toolbars, Sketching Toolbars, Sketching Planes, Line colors, Starting a New Part, Setting Grids and Units, Applying Basic Dimensions, Extruding and Revolving simple parts, Printing a Hard Copy.

Lab Work I: Involves hands-on practice sessions related to 2-D computer sketching.

Exercise 1: Study and draw 2-D sketching entities like lines, rectangle,

parallelogram polygon, circle etc., under SKETCH ENTITY MENU.

Exercise 2: (a) Rectangular array (b) Circular array

Exercise 3: Sketch of Metal grate

Exercise 4: Slotted Base

Exercise 5: Link

Exercise 6: Base Plate (Extruding the sketch)

Exercise 7: Bush (Revolve)

Exercise 8: Handle (Revolve)

Exercise 9: Flange coupling parts Page 42

Punjab Technical University

PTU/ DA/ 17th May 2011

B. Tech. 1st & 2nd Semester Batch-2011

Chairperson, BOS (Applied Science)

Dean

(Academics)

42

Exercise 10: Bell Crank Lever

Lab Work-II: Using the geometric shape and size data learnt in Lab Work I, extrude

or revolve the sketch to obtain 3-D drawing. Study and practice various options

available for 3-D drawing.

Exercise-1: Bracket Lever

Exercise 2: Hand Wheel

Exercise 3: Hexagonal Nut and Bolt

Exercise 4: Keys

Exercise 5: Body of Solid Journal Bearing

Exercise 6: Shaft

Exercise 7: Cup of Screw Jack

Exercise 8: Screw Jack Body

Exercise 9: V-Block

Exercise 10: Gland