PAPER CODE - 103201

BSC	PHYSICS (WAVES AND OPTICS, AND INTRODUCTION TO QUANTUM MECHANICS)	L:3	T:1	P:3	CREDIT:5.5

CONTENTS

MODULE 1: WAVES (3 LECTURES)

MECHANICAL AND ELECTRICAL SIMPLE HARMONIC OSCILLATORS, DAMPED HARMONIC OSCILLATOR, FORCED MECHANICAL AND ELECTRICAL OSCILLATORS, IMPEDANCE, STEADY STATE MOTION OF FORCED DAMPED HARMONIC OSCILLATOR

MODULE 2: NON-DISPERSIVE TRANSVERSE AND LONGITUDINAL WAVES (4 LECTURES)

TRANSVERSE WAVE ON A STRING, THE WAVE EQUATION ON A STRING, HARMONIC WAVES, REFLECTION AND TRANSMISSION OF WAVES AT A BOUNDARY, IMPEDANCE MATCHING, STANDING WAVES AND THEIR EIGEN FREQUENCIES, LONGITUDINAL WAVES AND THE WAVE EQUATION FOR THEM, ACOUSTICS WAVES

MODULE 3: LIGHT AND OPTICS (3 LECTURES)

LIGHT AS AN ELECTROMAGNETIC WAVE AND FRESNEL EQUATIONS, REFLECTANCE AND TRANSMITTANCE, BREWSTER'S ANGLE, TOTAL INTERNAL REFLECTION, AND EVANESCENT WAVE. MIRRORS AND LENSES AND OPTICAL INSTRUMENTS BASED ON THEM

MODULE 4: WAVE OPTICS (5 LECTURES)

HUYGENS' PRINCIPLE, SUPERPOSITION OF WAVES AND INTERFERENCE OF LIGHT BY WAVEFRONT SPLITTING AND AMPLITUDE SPLITTING; YOUNG'S DOUBLE SLIT EXPERIMENT, NEWTON'S RINGS, MICHELSON INTERFEROMETER, MACH ZEHNDER INTERFEROMETER. FARUNHOFER DIFFRACTION FROM A SINGLE SLIT AND A CIRCULAR APERTURE, THE RAYLEIGH CRITERION FOR LIMIT OF RESOLUTION AND ITS APPLICATION TO VISION; DIFFRACTION GRATINGS AND THEIR RESOLVING POWER

MODULE 5: LASERS (5 LECTURES)

EINSTEIN'S THEORY OF MATTER RADIATION INTERACTION AND A AND B COEFFICIENTS; AMPLIFICATION OF LIGHT BY POPULATION INVERSION, DIFFERENT TYPES OF LASERS: GAS LASERS (HE-NE, CO2), SOLID-STATE LASERS (RUBY, NEODYMIUM), DYE LASERS; PROPERTIES OF LASER BEAMS: MONO-CHROMATICITY

MODULE 6: INTRODUCTION TO QUANTUM MECHANICS (5 LECTURES)

WAVE NATURE OF PARTICLES, TIME-DEPENDENT AND TIME-INDEPENDENT SCHRODINGER EQUATION FOR WAVE FUNCTION, BORN INTERPRETATION, PROBABILITY CURRENT, EXPECTATION VALUES, FREE-PARTICLE WAVE FUNCTION AND WAVE-PACKETS, UNCERTAINTY PRINCIPLE.

MODULE 7: SOLUTION OF WAVE EQUATION (6 LECTURES)

SOLUTION OF STATIONARY-STATE SCHRODINGER EQUATION FOR ONE DIMENSIONAL PROBLEMS–PARTICLE IN A BOX, PARTICLE IN ATTRACTIVE DELTA-FUNCTION POTENTIAL, SQUARE-WELL POTENTIAL, LINEAR HARMONIC OSCILLATOR. SCATTERING FROM A POTENTIAL BARRIER AND TUNNELING; RELATED EXAMPLES LIKE ALPHA- DECAY, FIELD-IONIZATION AND SCANNING TUNNELING MICROSCOPE, TUNNELING IN SEMICONDUCTOR STRUCTURES. THREE-DIMENSIONAL PROBLEMS: PARTICLE IN THREE DIMENSIONAL BOX AND RELATED EXAMPLES.

MODULE 8: INTRODUCTION TO SOLIDS AND SEMICONDUCTORS (9 LECTURES)

FREE ELECTRON THEORY OF METALS, FERMI LEVEL, DENSITY OF STATES IN 1, 2 AND 3 DIMENSIONS, BLOCH'S THEOREM FOR PARTICLES IN A PERIODIC POTENTIAL, KRONIG-PENNEY MODEL AND ORIGIN OF ENERGY BANDS.

TYPES OF ELECTRONIC MATERIALS: METALS, SEMICONDUCTORS, AND INSULATORS. INTRINSIC AND EXTRINSIC SEMICONDUCTORS, DEPENDENCE OF FERMI LEVEL ON CARRIER-CONCENTRATION AND TEMPERATURE (EQUILIBRIUM CARRIER STATISTICS), CARRIER GENERATION AND RECOMBINATION, CARRIER TRANSPORT: DIFFUSION AND DRIFT, P -N JUNCTION.

TEXT / REFERENCES:

- *G. MAIN, "VIBRATIONS AND WAVES IN PHYSICS", CAMBRIDGE UNIVERSITY PRESS, 1993.*
- *H. J. PAIN, "THE PHYSICS OF VIBRATIONS AND WAVES", WILEY, 2006.*
- *E. HECHT, "OPTICS", PEARSON EDUCATION, 2008.*
- *A. GHATAK, "OPTICS", MCGRAW HILL EDUCATION, 2012.*
- *O. SVELTO, "PRINCIPLES OF LASERS", SPRINGER SCIENCE & BUSINESS MEDIA, 2010.*
- *D. J. GRIFFITHS, "QUANTUM MECHANICS", PEARSON EDUCATION, 2014.*
- *R. ROBINETT, "QUANTUM MECHANICS", OUP OXFORD, 2006.*
- *D. MCQUARRIE, "UANTUM CHEMISTRY", UNIVERSITY SCIENCE BOOKS, 2007.*
- *D. A. NEAMEN, "SEMICONDUCTOR PHYSICS AND DEVICES", TIMES MIRROR HIGH EDUCATION GROUP, CHICAGO, 1997.*
- *E.S. YANG, "MICROELECTRONIC DEVICES", MCGRAW HILL, SINGAPORE, 1988.*
- *B.G. STREETMAN, " SOLID STATE ELECTRONIC DEVICES", PRENTICE HALL OF INDIA, 1995*

LABORATORY –

PAPER CODE - 103202

BSC	MATHEMATICS –II (LINEAR ALGEBRA, TRANSFORM CALCULUS AND NUMERICAL METHODS)	L:3	T:1	P:0	CREDIT:4

MODULE 1: MATRICES (10 LECTURES)

ALGEBRA OF MATRICES, INVERSE AND RANK OF A MATRIX, RANK-NULLITY THEOREM; SYSTEM OF LINEAR EQUATIONS; SYMMETRIC, SKEW-SYMMETRIC AND ORTHOGONAL MATRICES; DETERMINANTS; EIGENVALUES AND EIGENVECTORS; DIAGONALIZATION OF MATRICES; CAYLEY-HAMILTON THEOREM, ORTHOGONAL TRANSFORMATION AND QUADRATIC TO CANONICAL FORMS.

MODULE 2: NUMERICAL METHODS-I (10 LECTURES)

SOLUTION OF POLYNOMIAL AND TRANSCENDENTAL EQUATIONS – BISECTION METHOD, NEWTON-RAPHSON METHOD AND REGULA-FALSI METHOD. FINITE DIFFERENCES, INTERPOLATION USING NEWTON'S FORWARD AND BACKWARD DIFFERENCE FORMULAE. CENTRAL DIFFERENCE INTERPOLATION: GAUSS'S FORWARD AND BACKWARD FORMULAE. NUMERICAL INTEGRATION: TRAPEZOIDAL RULE AND SIMPSON'S 1/3RD AND 3/8 RULES.

MODULE 3: NUMERICAL METHODS-II (10 LECTURES)

ORDINARY DIFFERENTIAL EQUATIONS: TAYLOR'S SERIES, EULER AND MODIFIED EULER'S METHODS. RUNGE- KUTTA METHOD OF FOURTH ORDER FOR SOLVING FIRST AND SECOND ORDER EQUATIONS. MILNE'S AND ADAM'S PREDICATOR-CORRECTOR METHODS. PARTIAL DIFFERENTIAL EQUATIONS: FINITE DIFFERENCE SOLUTION TWO DIMENSIONAL LAPLACE EQUATION AND POISSON EQUATION, IMPLICIT AND EXPLICIT METHODS FOR ONE DIMENSIONAL HEAT EQUATION (BENDER-SCHMIDT AND CRANK-NICHOLSON METHODS), FINITE DIFFERENCE EXPLICIT METHOD FOR WAVE EQUATION.

MODULE 4: TRANSFORM CALCULUS (10 LECTURES)

LAPLACE TRANSFORM, PROPERTIES OF LAPLACE TRANSFORM, LAPLACE TRANSFORM OF PERIODIC FUNCTIONS. FINDING INVERSE LAPLACE TRANSFORM BY DIFFERENT METHODS, CONVOLUTION THEOREM. EVALUATION OF INTEGRALS BY LAPLACE TRANSFORM, SOLVING ODES AND PDES BY LAPLACE TRANSFORM METHOD. FOURIER TRANSFORMS.

TEXT / REFERENCES:

- *D. POOLE, "LINEAR ALGEBRA: A MODERN INTRODUCTION", BROOKS/COLE, 2005.*
- *N.P. BALI AND M. GOYAL, "A TEXT BOOK OF ENGINEERING MATHEMATICS", LAXMI PUBLICATIONS, 2008.*
- *B.S. GREWAL, "HIGHER ENGINEERING MATHEMATICS", KHANNA PUBLISHERS, 2010.*
- *V. KRISHNAMURTHY, V. P. MAINRA AND J. L. ARORA, "AN INTRODUCTION TO LINEAR ALGEBRA", AFFILIATED EAST-WEST PRESS, 2005.*

PAPER CODE – 100101 || 100201

ESC	BASIC ELECTRICAL ENGINEERING	L:3	T:1	P:2	CREDIT:5

MODULE 1: DC CIRCUITS (8 LECTURES)

ELECTRICAL CIRCUIT ELEMENTS (R, L AND C), VOLTAGE AND CURRENT SOURCES, KIRCHHOFF CURRENT AND VOLTAGE LAWS, ANALYSIS OF SIMPLE CIRCUITS WITH DC EXCITATION. STAR-DELTA CONVERSION, NETWORK THEOREMS (SUPERPOSITION, THEVENIN, NORTON AND MAXIMUM POWER TRANSFER THEOREMS). TIME-DOMAIN ANALYSIS OF FIRST-ORDER RL AND RC CIRCUITS

MODULE 2: AC CIRCUITS (8 LECTURES)

REPRESENTATION OF SINUSOIDAL WAVEFORMS, PEAK, RMS AND AVERAGE VALUES (FORM FACTOR AND PEAK FACTOR), IMPEDANCE OF SERIES AND PARALLEL CIRCUIT, PHASOR REPRESENTATION, REAL POWER, REACTIVE POWER, APPARENT POWER, POWER FACTOR, POWER TRIANGLE. ANALYSIS OF SINGLE-PHASE AC CIRCUITS CONSISTING OF R, L, C, RL, RC, RLC COMBINATIONS (SERIES AND PARALLEL), RESONANCE. THREE-PHASE BALANCED CIRCUITS, VOLTAGE AND CURRENT RELATIONS IN STAR AND DELTA CONNECTIONS.

MODULE 3: MAGNETIC CIRCUITS: (4 LECTURES)

INTRODUCTION, SERIES AND PARALLEL MAGNETIC CIRCUITS, ANALYSIS OF SERIES AND PARALLEL MAGNETIC CIRCUITS.

MODULE 4: TRANSFORMERS (6 LECTURES)

MAGNETIC MATERIALS, BH CHARACTERISTICS, IDEAL AND PRACTICAL TRANSFORMER, EMF EQUATION, EQUIVALENT CIRCUIT, LOSSES IN TRANSFORMERS, REGULATION AND EFFICIENCY. AUTO-TRANSFORMER AND THREE-PHASE TRANSFORMER CONNECTIONS.

MODULE 5: ELECTRICAL MACHINES (10 LECTURES)

CONSTRUCTION, WORKING, TORQUE-SPEED CHARACTERISTIC AND SPEED CONTROL OF SEPARATELY EXCITED DC MOTOR. GENERATION OF ROTATING MAGNETIC FIELDS, CONSTRUCTION AND WORKING OF A THREE-PHASE INDUCTION MOTOR, SIGNIFICANCE OF TORQUE-SLIP CHARACTERISTIC. LOSS COMPONENTS AND EFFICIENCY, STARTING AND SPEED CONTROL OF INDUCTION MOTOR. CONSTRUCTION AND WORKING OF SYNCHRONOUS GENERATORS.

MODULE 6: ELECTRICAL INSTALLATIONS (6 LECTURES)

COMPONENTS OF LT SWITCHGEAR: SWITCH FUSE UNIT (SFU), MCB, ELCB, MCCB, TYPES OF WIRES AND CABLES, EARTHING. TYPES OF BATTERIES, IMPORTANT

CHARACTERISTICS FOR BATTERIES. ELEMENTARY CALCULATIONS FOR ENERGY CONSUMPTION, POWER FACTOR IMPROVEMENT AND BATTERY BACKUP.

SUGGESTED TEXT / REFERENCE BOOKS

- *D. P. KOTHARI AND I. J. NAGRATH, "BASIC ELECTRICAL ENGINEERING", TATA MCGRAW HILL, 2010.*
- *D. C. KULSHRESHTHA, "BASIC ELECTRICAL ENGINEERING", MCGRAW HILL, 2009.*
- *L. S. BOBROW, "FUNDAMENTALS OF ELECTRICAL ENGINEERING", OXFORD UNIVERSITY PRESS, 2011.*
- *E. HUGHES, "ELECTRICAL AND ELECTRONICS TECHNOLOGY", PEARSON, 2010.*
- *V. D. TORO, "ELECTRICAL ENGINEERING FUNDAMENTALS", PRENTICE HALL INDIA, 1989.*
- *BASIC ELECTRICAL ENGINEERING BY FITZERALD, ET AL, TATA MCGRAW HILL*
- *FUNDAMENTALS OF ELECTRICAL ENGG. BY R. PRASAD, PHI PUBLICATION*
- *BASIC ELECTRICAL ENGINEERING BY V.K. MEHTA AND ROHIT MEHTA, S.CHAND PUBLICATION*

COURSE OUTCOMES

- TO UNDERSTAND AND ANALYZE BASIC ELECTRIC AND MAGNETIC CIRCUITS
- TO STUDY THE WORKING PRINCIPLES OF ELECTRICAL MACHINES AND POWER CONVERTERS.
- TO INTRODUCE THE COMPONENTS OF LOW VOLTAGE ELECTRICAL INSTALLATIONS

LABORATORY

LIST OF EXPERIMENTS/DEMONSTRATIONS

- BASIC SAFETY PRECAUTIONS. INTRODUCTION AND USE OF MEASURING INSTRUMENTS – VOLTMETER, AMMETER, MULTI-METER, OSCILLOSCOPE. REAL-LIFE RESISTORS, CAPACITORS AND INDUCTORS.
- MEASURING THE STEADY-STATE AND TRANSIENT TIME-RESPONSE OF R-L, R-C, AND R-L-C CIRCUITS TO A STEP CHANGE IN VOLTAGE (TRANSIENT MAY BE OBSERVED ON A STORAGE OSCILLOSCOPE). SINUSOIDAL STEADY STATE RESPONSE OF R-L, AND R-C CIRCUITS – IMPEDANCE CALCULATION AND VERIFICATION. OBSERVATION OF PHASE DIFFERENCES BETWEEN CURRENT AND VOLTAGE. RESONANCE IN R-L-C CIRCUITS.
- TRANSFORMERS: OBSERVATION OF THE NO-LOAD CURRENT WAVEFORM ON AN OSCILLOSCOPE (NON- SINUSOIDAL WAVE-SHAPE DUE TO B-H CURVE NONLINEARITY SHOULD BE SHOWN ALONG WITH A DISCUSSION ABOUT HARMONICS). LOADING OF A TRANSFORMER: MEASUREMENT OF PRIMARY AND SECONDARY VOLTAGES AND CURRENTS, AND POWER.
- THREE-PHASE TRANSFORMERS: STAR AND DELTA CONNECTIONS. VOLTAGE AND CURRENT RELATIONSHIPS (LINE-LINE VOLTAGE, PHASE-TO-NEUTRAL VOLTAGE, LINE AND PHASE CURRENTS). PHASE-SHIFTS BETWEEN THE PRIMARY AND SECONDARY SIDE. CUMULATIVE THREE-PHASE POWER IN BALANCED THREE-PHASE CIRCUITS.
- DEMONSTRATION OF CUT-OUT SECTIONS OF MACHINES: DC MACHINE (COMMUTATOR-BRUSH ARRANGEMENT), INDUCTION MACHINE (SQUIRREL CAGE ROTOR), SYNCHRONOUS MACHINE (FIELD WINGING - SLIP RING ARRANGEMENT) AND SINGLE-PHASE INDUCTION MACHINE.
- TORQUE SPEED CHARACTERISTIC OF SEPARATELY EXCITED DC MOTOR.
- SYNCHRONOUS SPEED OF TWO AND FOUR-POLE, THREE-PHASE INDUCTION MOTORS. DIRECTION REVERSAL BY CHANGE OF PHASE-SEQUENCE OF CONNECTIONS. TORQUE-

SLIP CHARACTERISTIC OF AN INDUCTION MOTOR. GENERATOR OPERATION OF AN INDUCTION MACHINE DRIVEN AT SUPER- SYNCHRONOUS SPEED.

- SYNCHRONOUS MACHINE OPERATING AS A GENERATOR: STAND-ALONE OPERATION WITH A LOAD. CONTROL OF VOLTAGE THROUGH FIELD EXCITATION.
- DEMONSTRATION OF (A) DC-DC CONVERTERS (B) DC-AC CONVERTERS – PWM WAVEFORM (C) THE USE OF DC-AC CONVERTER FOR SPEED CONTROL OF AN INDUCTION MOTOR AND (D) COMPONENTS OF LT SWITCHGEAR.

LABORATORY OUTCOMES

- GET AN EXPOSURE TO COMMON ELECTRICAL COMPONENTS AND THEIR RATINGS.
- MAKE ELECTRICAL CONNECTIONS BY WIRES OF APPROPRIATE RATINGS.
- UNDERSTAND THE USAGE OF COMMON ELECTRICAL MEASURING INSTRUMENTS.
- UNDERSTAND THE BASIC CHARACTERISTICS OF TRANSFORMERS AND ELECTRICAL MACHINES.
- GET AN EXPOSURE TO THE WORKING OF POWER ELECTRONIC CONVERTERS

PAPER CODE – 100102 || 100202

ESC	ENGINEERING GRAPHICS & DESIGN	L:1	T:0	P:4	CREDIT:3

TRADITIONAL ENGINEERING GRAPHICS:

PRINCIPLES OF ENGINEERING GRAPHICS; ORTHOGRAPHIC PROJECTION; DESCRIPTIVE GEOMETRY; DRAWING PRINCIPLES; ISOMETRIC PROJECTION; SURFACE DEVELOPMENT; PERSPECTIVE; READING A DRAWING; SECTIONAL VIEWS; DIMENSIONING & TOLERANCES; TRUE LENGTH, ANGLE; INTERSECTION, SHORTEST DISTANCE.

COMPUTER GRAPHICS:

ENGINEERING GRAPHICS SOFTWARE; -SPATIAL TRANSFORMATIONS; ORTHOGRAPHIC PROJECTIONS; MODEL VIEWING; CO-ORDINATE SYSTEMS; MULTI-VIEW PROJECTION; EXPLODED ASSEMBLY; MODEL VIEWING; ANIMATION; SPATIAL MANIPULATION; SURFACE MODELLING; SOLID MODELLING, INTRODUCTION TO BUILDING INFORMATION MODELLING (BIM).

(EXCEPT THE BASIC ESSENTIAL CONCEPTS, MOST OF THE TEACHING PART CAN HAPPEN CONCURRENTLY IN THE LABORATORY)

MODULE 1: INTRODUCTION TO ENGINEERING DRAWING

PRINCIPLES OF ENGINEERING GRAPHICS AND THEIR SIGNIFICANCE, USAGE OF DRAWING INSTRUMENTS, LETTERING, CONIC SECTIONS INCLUDING THE RECTANGULAR HYPERBOLA (GENERAL METHOD ONLY); CYCLOID, EPICYCLOID, HYPOCYCLOID AND INVOLUTE; SCALES – PLAIN, DIAGONAL AND VERNIER SCALES

MODULE 2: ORTHOGRAPHIC PROJECTIONS

PRINCIPLES OF ORTHOGRAPHIC PROJECTIONS-CONVENTIONS -PROJECTIONS OF POINTS AND LINES INCLINED TO BOTH PLANES; PROJECTIONS OF PLANES INCLINED PLANES - AUXILIARY PLANES

MODULE 3: PROJECTIONS OF REGULAR SOLIDS

THOSE INCLINED TO BOTH THE PLANES- AUXILIARY VIEWS; DRAW SIMPLE ANNOTATION, DIMENSIONING AND SCALE. FLOOR PLANS THAT INCLUDE: WINDOWS, DOORS, AND FIXTURES SUCH AS WC, BATH, SINK, SHOWER, ETC.

MODULE 4: SECTIONS AND SECTIONAL VIEWS OF RIGHT ANGULAR SOLIDS

COVERING, PRISM, CYLINDER, PYRAMID, CONE – AUXILIARY VIEWS; DEVELOPMENT OF SURFACES OF RIGHT REGULAR SOLIDS- PRISM, PYRAMID, CYLINDER AND CONE; DRAW THE SECTIONAL ORTHOGRAPHIC VIEWS OF GEOMETRICAL SOLIDS, OBJECTS FROM INDUSTRY AND DWELLINGS (FOUNDATION TO SLAB ONLY)

MODULE 5: ISOMETRIC PROJECTIONS

PRINCIPLES OF ISOMETRIC PROJECTION – ISOMETRIC SCALE, ISOMETRIC VIEWS, CONVENTIONS; ISOMETRIC VIEWS OF LINES, PLANES, SIMPLE AND COMPOUND SOLIDS; CONVERSION OF ISOMETRIC VIEWS TO ORTHOGRAPHIC VIEWS AND VICE-VERSA, CONVENTIONS

MODULE 6: OVERVIEW OF COMPUTER GRAPHICS

LISTING THE COMPUTER TECHNOLOGIES THAT IMPACT ON GRAPHICAL COMMUNICATION, DEMONSTRATING KNOWLEDGE OF THE THEORY OF CAD SOFTWARE [SUCH AS: THE MENU SYSTEM, TOOLBARS (STANDARD, OBJECT PROPERTIES, DRAW, MODIFY AND DIMENSION), DRAWING AREA (BACKGROUND, CROSSHAIRS, COORDINATE SYSTEM), DIALOG BOXES AND WINDOWS, SHORTCUT MENUS (BUTTON BARS), THE COMMAND LINE (WHERE APPLICABLE), THE STATUS BAR, DIFFERENT METHODS OF ZOOM AS USED IN CAD, SELECT AND ERASE OBJECTS.; ISOMETRIC VIEWS OF LINES, PLANES, SIMPLE AND COMPOUND SOLIDS]

MODULE 7: CUSTOMISATION& CAD DRAWING

CONSISTING OF SET UP OF THE DRAWING PAGE AND THE PRINTER, INCLUDING SCALE SETTINGS, SETTING UP OF UNITS AND DRAWING LIMITS; ISO AND ANSI STANDARDS FOR COORDINATE DIMENSIONING AND TOLERANCING; ORTHOGRAPHIC CONSTRAINTS, SNAP TO OBJECTS MANUALLY AND AUTOMATICALLY; PRODUCING DRAWINGS BY USING VARIOUS COORDINATE INPUT ENTRY METHODS TO DRAW STRAIGHT LINES, APPLYING VARIOUS WAYS OF DRAWING CIRCLES.

MODULE 8: ANNOTATIONS, LAYERING & OTHER FUNCTIONS

COVERING APPLYING DIMENSIONS TO OBJECTS, APPLYING ANNOTATIONS TO DRAWINGS; SETTING UP AND USE OF LAYERS, LAYERS TO CREATE DRAWINGS, CREATE, EDIT AND USE CUSTOMIZED LAYERS; CHANGING LINE LENGTHS THROUGH MODIFYING EXISTING LINES (EXTEND/LENGTHEN); PRINTING DOCUMENTS TO PAPER USING THE PRINT COMMAND; ORTHOGRAPHIC PROJECTION TECHNIQUES; DRAWING SECTIONAL VIEWS OF COMPOSITE RIGHT REGULAR GEOMETRIC SOLIDS AND PROJECT THE TRUE SHAPE OF THE SECTIONED SURFACE; DRAWING ANNOTATION, COMPUTER-AIDED DESIGN (CAD) SOFTWARE MODELING OF PARTS AND ASSEMBLIES. PARAMETRIC AND NON-PARAMETRIC SOLID, SURFACE, AND WIREFRAME MODELS. PART EDITING AND TWO-DIMENSIONAL DOCUMENTATION OF MODELS. PLANAR PROJECTION THEORY, INCLUDING SKETCHING OF PERSPECTIVE, ISOMETRIC, MULTIVIEW, AUXILIARY, AND SECTION VIEWS. SPATIAL VISUALIZATION EXERCISES. DIMENSIONING GUIDELINES, TOLERANCING TECHNIQUES; DIMENSIONING AND SCALE MULTI VIEWS OF DWELLING.

MODULE 9: DEMONSTRATION OF A SIMPLE TEAM DESIGN PROJECT THAT ILLUSTRATES

GEOMETRY AND TOPOLOGY OF ENGINEERED COMPONENTS: CREATION OF ENGINEERING MODELS AND THEIR PRESENTATION IN STANDARD 2D BLUEPRINT FORM AND AS 3D WIRE-FRAME AND SHADED SOLIDS; MESHED TOPOLOGIES FOR ENGINEERING ANALYSIS AND TOOL-PATH GENERATION FOR COMPONENT MANUFACTURE; GEOMETRIC DIMENSIONING AND TOLERANCING; USE OF SOLID-MODELING SOFTWARE FOR CREATING ASSOCIATIVE MODELS AT THE COMPONENT AND ASSEMBLY LEVELS. FLOOR PLANS THAT INCLUDE: WINDOWS, DOORS, AND FIXTURES SUCH AS WC, BATH, SINK, SHOWER, ETC. APPLYING COLOUR CODING

ACCORDING TO BUILDING DRAWING PRACTICE; DRAWING SECTIONAL ELEVATION SHOWING FOUNDATION TO CEILING; INTRODUCTION TO BUILDING INFORMATION MODELLING (BIM).

SUGGESTED TEXT/REFERENCE BOOKS:

- *BHATT N.D., PANCHAL V.M. & INGLE P.R., (2014), ENGINEERING DRAWING, CHAROTAR PUBLISHING HOUSE*
- *SHAH, M.B. &RANA B.C. (2008), ENGINEERING DRAWING AND COMPUTER GRAPHICS, PEARSON EDUCATION*
- *AGRAWAL B. & AGRAWAL C. M. (2012), ENGINEERING GRAPHICS, TMH PUBLICATION*
- *NARAYANA, K.L. & P KANNAIAH (2008), TEXT BOOK ON ENGINEERING DRAWING, SCITECHPUBLISHERS*
- *(CORRESPONDING SET OF) CAD SOFTWARE THEORY AND USER MANUALS*

COURSE OUTCOMES

ALL PHASES OF MANUFACTURING OR CONSTRUCTION REQUIRE THE CONVERSION OF NEW IDEAS AND DESIGN CONCEPTS INTO THE BASIC LINE LANGUAGE OF GRAPHICS. THEREFORE, THERE ARE MANY AREAS (CIVIL, MECHANICAL, ELECTRICAL, ARCHITECTURAL AND INDUSTRIAL) IN WHICH THE SKILLS OF THE CAD TECHNICIANS PLAY MAJOR ROLES IN THE DESIGN AND DEVELOPMENT OF NEW PRODUCTS OR CONSTRUCTION. STUDENTS PREPARE FOR ACTUAL WORK SITUATIONS THROUGH PRACTICAL TRAINING IN A NEW STATE-OF-THE-ART COMPUTER DESIGNED CAD LABORATORY USING ENGINEERING SOFTWARE

THIS COURSE IS DESIGNED TO ADDRESS:

- TO PREPARE YOU TO DESIGN A SYSTEM, COMPONENT, OR PROCESS TO MEET DESIRED NEEDS WITHIN REALISTIC CONSTRAINTS SUCH AS ECONOMIC, ENVIRONMENTAL, SOCIAL, POLITICAL, ETHICAL, HEALTH AND SAFETY, MANUFACTURABILITY, AND SUSTAINABILITY
- TO PREPARE YOU TO COMMUNICATE EFFECTIVELY
- TO PREPARE YOU TO USE THE TECHNIQUES, SKILLS, AND MODERN ENGINEERING TOOLS NECESSARY FOR ENGINEERING PRACTICE

THE STUDENT WILL LEARN:

- INTRODUCTION TO ENGINEERING DESIGN AND ITS PLACE IN SOCIETY
- EXPOSURE TO THE VISUAL ASPECTS OF ENGINEERING DESIGN
- EXPOSURE TO ENGINEERING GRAPHICS STANDARDS
- EXPOSURE TO SOLID MODELLING
- EXPOSURE TO COMPUTER-AIDED GEOMETRIC DESIGN
- EXPOSURE TO CREATING WORKING DRAWINGS
- EXPOSURE TO ENGINEERING COMMUNICATION