First Year, Second Semester Diploma Mechanical Engineering

सत्यं शिवं सुन्दरम् Estd. 1949 Accredited Grade "A+" by NAAC	**The Maharaja Sayajirao University of Baroda** Polytechnic, Department of Mechanical Engineering Near Shastri Bridge, Fatehgunj, Vadodara 390002 Ph: 02652783914-15 email: principal-poly@msubaroda.ac.in	Last Revision 2018-19

Second Semester First Year Diploma Mechanical			
Year: I	**ENGINEERING DRAWING – II (MEC3214)**	MARKS	100(T)+50(T.W/VIVA)
Semester: II		HOURS	45(T)+60(P)
Course Outcomes	CO1 Understand and apply the basics of various types of sections to draw sectional orthographic projections. CO2 Interpret 2D views and convert to isometric views. CO3 Apply the concept of projection of solids to draw section in various solids with its true shape. CO4 Apply the concept of surface development in sheet metal work. CO5 Understand application of engineering parts & draw the free hand sketches for practical purpose.		

Unit No.	Content	Contact Hours	Theory Marks
UNIT-I	Sectional views.(Orthographic projections)	09	20
UNIT-II	Isometric projections	10	22
UNIT-III	Missing views	05	11
UNIT-IV	Section of solids	09	20
UNIT-V	Development of cut surface of all types of solid	08	18
UNIT-VI	**Freehand sketches** Types of foundation bolt. Eye foundation bolt , ii) Rag bolt, iii) Lewis foundation bolt, iv) Cotter foundation bolt. Cotter joint Socket spigot joint, ii) Strap joint with gib and cotter, iii) pin or knuckle joint, iv) cotter joint with sleeve. Shaft couplings Box or muff coupling, ii) Flanged coupling, iii) Protected type flanged coupling, iv) Universal coupling Shaft bearing pivot, ii) journal, iii) thrust, iv) Solid bearing, v) bushed bearing, vi) foot step bearing, vii)Methods of preventing rotation of brasses. Types of screw threads and its elements. Square thread, ii) Acme thread, iii) Knuckle thread, iv) Sellers thread v) British association thread vi) With worth thread, vii) Triangular thread or V thread, viii) Unified thread, ix) Buttress thread	04	9

REFERENCES

First Year, Second Semester Diploma Mechanical Engineering

1.	Elements of Engineering Drawing – N.D. Bhatt
2.	Text Book of Engineering Drawing – P.J. Shah
3.	Machine Drawing – N.D. Bhatt & V.M. Panchal

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Second Semester First Year Diploma Mechanical			
Year: I	**BASIC OF COMPUTER AND GRAPHICS SOFTWARE/S. (MEC3213L)**	MARKS	100(TW/PRA/VIVA)
Semester: II		HOURS	60(P)
Course Outcomes	CO1 Understand basic components of computers and appropriately prepare Documents, Presentations and Create worksheet. CO2 Apply computer Aided Drafting Tools to create 2D and 3D Engineering Drawings.		

Unit No.	Topic	Contact Hours	Weightage (%)
1	**Fundamental of computers** Brief description of Computer peripheral devices, Central process unit (CPU)	02	10
2	**Fundamental of software and Internet** Virus & Antivirus, Use of application software like MS office.(Word, Excel and Power point or any other and widely used software) Introduction to Internet, it's governs and working. IP-address, Domain name, Applications of internet, Any other recent topic related to the internet.	10	30
3	**Graphics (Drafting) software** AutoCAD software: Description, Advantages of Autocad, detailed knowledge regarding various AutoCAD commands necessary for drawing the 2-D & 3-D Drawings. Introduction to Autolisp and its use. Brief exposure to modeling software (e.g. Inventor, or any other currently and widely used software).Brief knowledge about various drawing, design and manufacturing software used in Mechanical Engineering, (like AutoCAD, Inventor, Pro-e, Ideas, Catia, Solid edge & any other currently and widely used software.	48	60

REFERENCES

First Year, Second Semester Diploma Mechanical Engineering

1.	Fundamentals of Computers – V.Rajaraman
2.	Fundamentals of Computers – Milind Oka
3.	Software & System an Introduction – U.K. Chakraborty, D.Ghosh, Dastidar
4	Mastering in AutoCad by George Omura.
5	www.Howstuffworks.com
6	www. Autodesk.com

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Year: I	**APPLIED MATHEMATICS – II (AMT3208)**	MARKS	100(T)=25(TU/TW/ VIVA)
Semester: II		HOURS	60(T)+15(Tutorial)
Course Outcomes	CO1 Evaluate determinants and solve system of linear equations using determinants and matrices too; outline concept of Vector Algebra CO2 Find the indefinite integrals of algebraic, exponential, logarithmic, trigonometric functions using the methods of substitution, trigonometric substitution , integration by parts and integration by partial fractions. CO3 List and prove the properties of definite integrals and and utilize them to evaluate the definite integrals CO4 Apply the knowledge of integration in solving various physical problems. CO5 Categorize and solve first order, first degree ordinary differential equations and solve higher order linear ordinary differential equations with constant coefficients		

Unit No.	Content	CONTACT HOURS	Theory Marks
1	<u>Determinants</u> Equation of second and third order determinants, Properties, Minors and Cofactors, solution of simultaneous linear equations in two and three unknowns, Consistency condition <u>Matrices</u> Definition and operation, Transpose, adjoint and Inverse of a matrix, solution of simultaneous linear equations in two andthree unknowns. <u>Vector Algebra</u> Introduction, Addition of Vectors, Properties of Addition of Vectors, Subtraction of a vector, Multiplication of a Vector by scalar, Position Vector, Product of two Vectors, Scalar or dot Product. Work done as a scalar product, vector product or cross product, scalar triple product	14	**15**

2	Indefinite Integration Standard formulae, Integration by substitution, Integration by Algebraic functions, Integration by parts, Trigonometric substitutions, Integration by the method of partial fractions	10	20
3	Definite Integration Definite Integrals : Definition, Definite Integrals as the limit of a sum, properties of definite integrals	08	**15**
4	Application of Integration: Area under the curve, Volume of solid of revolution, Approximate integration- (Simpson's rule Trapezoidal rule),Center of gravity of plane regions, Length of Arc (of a plane curve), Area of surface of revolution	12	**20**
5	Differential Equations**:** Formation of differential equations, Separation of variables, Equations reducible to separation of variables, Homogeneous differential equations, Equation reducible to homogeneous, Linear Differential Equation, Equation Reducible to Linear form, Exact Differential Equations	10	15
6	Higher order linear differential equations Linear differential equations of higher order with constant coefficients and Engineering applications	06	**15**

REFERENCES

1.	Applied Mathematics Semester III (Common to all branches) by G.V.Kumbhojkar , Mrs. R.P.Kumbhojkar, Phadke Prakashan, Kolhapur. (14th Edition)
2.	Engineering Mathematics Semester II (Civil,Mechanical,Chemical,Electrical and Electronics Group) by G.V.Kumbhojkar , Mrs. R.P.Kumbhojkar, Phadke Prakashan, Kolhapur. (1st Edition)
3.	Polytechnic Mathematics Made Easy (Applied Mathematics) by Manjeet Singh , Dhanpat Rai & Co. (P) Ltd. (Edition 2004)
4.	Mathematics for Polytechnic students, Semester 3, by S. P. Deshpande, Pune Vidyarthi Gruha Prakashan. (For Diploma Students).
5.	Elementary Engineering Mathematics by B. S. Grewal, Khanna Publishers
6.	Kreyzing Erwin: Advanced Engineering Mathematics, Wiley Eastern Limited
7.	C R Wyle: Advanced Engineering Mathmatics

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Last Revision 2018-19

Second Semester First Year Diploma Mechanical

Year: I	**APPLIED PHYSICS – II (APH 3203)**	MARKS	50(T)+50(P)
Semester: II		HOURS	30 (T)+30(P)
Course Outcomes	CO1 Understand basic concepts of Heat and thermodynamics. Apply the laws of thermodynamics to various systems. CO2 Gain knowledge of various properties of fluids and applications of their properties in engineering.		

First Year, Second Semester Diploma Mechanical Engineering

	CO3 Understand the nature of light by analysing phenomena of interference, diffraction and polarisation. CO4 Study the physical behaviour, applications and properties of photons, X-rays, lasers, fibre optics and related phenomena. CO5 Appreciate the applications of physical phenomenon of radioactivity and also to understand the physical principles behind non-destructive testing methods.

UNIT NO.	TOPIC	Contact Hours	Theory Marks
1	**Heat and Thermodynamics** Temperature and zeroth law of thermodynamics, heat and work, specific heat capacity and latent heat, first and second laws of thermodynamics, heat engine and its efficiency, entropy and its non-conservation	**06**	12
2	**Properties of Matter** Surface tension, molecular force, cohesive and adhesive force, molecular range, definition of surface tension, angle of contact, surface tension through capillary rise method, Viscosity; Fluid friction, viscous force, definition of viscosity, coefficient of viscosity, stokes' law, Fluid flow, equation of continuity, Bernoulli's theorem and its applications	**07**	12
3	**Optics** Light as a wave and its characteristics, equation of a plane progressive wave, Interference of light, principle of superposition, young's double-slit experiment, constructive and destructive interference, diffraction of light, types of diffraction, diffraction through grating, polarization, types of polarization, Brewster's law and Malus' law, applications	**06**	08
4	**Modern Physics** Black-body radiation, Planck's constant, Photoelectric effect: Einstein's equation, application of photoelectric effect, X-rays their production, properties and applications, LASERS:-properties and applications, types of LASER, Fibre optics and its applications, Superconductivity-idea of superconductors, Properties of superconductors, Meissner effect; perfect diamagnetism, critical temperature, high Tc superconductors and their applications	**06**	10
5	**Engineering Applications of Physical Science** Radioactivity: -Types of radioactivity, units of radioactivity, properties of α, β and γ radiations, Application of radioactivity; radioisotopes, energy generation and other applications Non-Destructive Testing; Ultrasonic Testing(UT), Radiography testing	**05**	08

REFERENCE	
1	Engg. Physics by R.K. Gaur and S.I. Gupta Published by Dhanpat Rai & Sons, Delhi.
2	Principles of Physics by N. Subramanyam and Brijlal, Published by S. Chand & Co., Delhi.
3	Applied physics for diploma courses by G.G.Umrani, M.S.Pawar, and M.A. Sutar. Nirali Publication.

First Year, Second Semester Diploma Mechanical Engineering

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Year: I	**APPLIED CHEMISTRY – II (ACH3209)**	MARKS	50(T)+50(TW/PRA/ VIVA)
Semester: II		HOURS	30(L)+30(P)
Course Outcomes	CO1 Will know about organic compound their classification, nomenclature, preparation, properties and uses. CO2 Understand classification and synthesis of high polymer and learn classification and properties of fuels. CO3 Learn about preparation, properties and uses of cement, lime, refractories, glass and lubricants. CO4 Understand and apply principle and concepts in catalysis. CO5 Analyse the salt solution quantitatively through experiments in laboratory.		

UNIT NO.	TOPIC	Contact Hours	Theory Marks
1	**Introduction to Organic Chemistry** Introduction of organic compounds, classification and nomenclature of aliphatic organic compounds; general methods of preparation and properties of aliphatic hydrocarbons and alcohols.	05	9
2	**High Polymers** Introduction, classification of polymers, synthesis of high polymers; plastics: properties and uses of plastics; classification of synthetic plastics, theory of formation of plastics, compounding of plastics, formation of thermoplastic and thermosetting materials; Rubber: introduction, types of rubber, vulcanization of rubber, synthetic rubber elastomers, formation of elastomers, natural rubber.	05	9
3	**Fuel** Fuel, essential properties of fuels, classification of fuels: natural and prepared fuels; types of coal, coke, petroleum, producer gas, water gas, coal gas.	05	6
4	**Catalysis** Catalyst, characteristics of catalytic action; types of catalysis; theories of catalysis, industrial applications.	05	10
5	**Cement, Lime, Refractories and glass** Cement: classification of cement, manufacture of Portland cement, compound composition of Portland cement, setting and hardening of Portland cement; Lime: manufacture, properties and uses of lime; Refractories: classification, properties and uses of refractories; Glass: types of glass, mechanical properties of glasses, annealing of glass, chemical and physical properties of glass.	05	7
6	**Lubricants** Metallic friction, lubricants: types of lubricants: lubrication fluid	05	9

	film lubrications, boundary lubrications and extreme pressure lubrications; classification of lubricants, liquid lubricants, solid lubricants, properties of		

REFERENCES	
1.	Inorganic chemistry by P.L.Soni
2.	Physical Chemistry by Bhal & Tuli
3.	Text book of Organic Chemistry by P.L.Soni

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Year: I	**STRENGTH OF MATERIAL – I (APM3203)**	MARKS	100(T)+50(TW/ VIVA)
Semester: II		HOURS	60(T)+30(P)
Course Outcomes	CO1 Students will be able to relate laws of mechanics to determine efficiency of simple machines with consideration of friction CO2 Students will be able to describe the motion of a particle in terms of its position, velocity and acceleration. CO3 Students will be able to associate and compute the concepts of stress and strain, strain energy at a point and relation between all elastic constants. CO4 Students will be able to illustrate rotational inertia and value of shear force and bending moment for structure analysis. CO5 Students will be able to demonstrate mechanical properties of different engineering materials by laboratory experiments.		

Unit No.	Content	Contact hours	Theory Marks
UNIT-I	**SIMPLE LIFTING MACHINE** Machine, mechanical advantage, velocity ratio, efficiency, friction loss in terms of effort and load, condition for reversibility, law of machine, maximum efficiency, types of lifting machine and their VR	10	10
UNIT-II	**KINEMATICS** Definition, equation of motion with uniform acceleration, velocity-time diagram, two bodies in linear motion, Motion of rotation, Motion along circular path including centripetal acceleration and centrifugal force	12	25
UNIT-III	**KINETICS** Basic laws of motion, Relation between Force, Mass and Acceleration	4	10
	WORK, POWER AND ENERGY	4	5

First Year, Second Semester Diploma Mechanical Engineering

UNIT-IV	Work, Graphical representation of work, Power, Energy, Form of energy, Conservation of energy		
UNIT-V	**SIMPLE STRESS AND STRAIN** Stress-strain curve, Yield load, ultimate load, breaking load, Factor of safety, modulus of elasticity, principle of superposition, stress in bars in varying section, stress in composite section, Temperature stresses in simple and composite section	6	10
UNIT-VI	**LINEAR AND LATERAL STRAIN** Poisson's ratio, volumetric strain, Three dimensional stress strain analysis, Modulus of rigidity, Bulk modulus, Relation between E, G and K	6	8
UNIT-VII	**STRAIN ENERGY** Definition, Stress due to strain energy for different load such as (a)gradual load, (b)sudden load and (c)impact load	3	10
UNIT-VIII	**BENDING MOMENT AND SHEAR FORCE** Definition of B.M and S.F, S.F and B.M diagrams for cantilever, simply supported and over hanging beams, Relation between SF and BM, Point of contraflexure	6	10
UNIT IX	**THEORY OF BENDING** Assumption in theory of bending, equations of bending, Moment of Resistance, bending stresses, Moment of Inertia, Parallel axis theorem, M.I. of unsymmetrical sections like L, I, channel sections etc., and composite built-up section	7	8
UNIT X	**THIN CYLINDRICAL SHELL** Derivation of hoop and longitudinal stress, Hoop strain and longitudinal strain, volumetric strain	2	4

REFERENCES

1. Mechanics of Structure - S. B Junarkar & H. J Shah
2. Mechanics of Structure - T. D. Bhagiya
3. Strength of material - R. S. Khurmi

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Year: I	**COMMUNICATION SKILL-II (ENG3207)**	MARKS	50
Semester: II		HOURS	30
	CO1 Identify and correct the grammatical errors CO2 Analyze, interpret and summarize the information		

First Year, Second Semester Diploma Mechanical Engineering

Course Outcomes	CO3 Transfer information from visual to verbal form CO4 Communicate effectively in formal/official writing in English CO5 Communicate logically and effectively in Presentations, Group Discussions and Interviews

Unit No.	Content	Contact hours	Theory Marks
1	**STRENGTHENING GRAMMAR AND ENHANCING VOCABULARY** Voice, Framing Questions, Question tags, Negatives, Degrees of Comparison, Confusing pair of words, One word for substitution, Error analysis	06	**10marks= 20%**
2	**DEVELOPING READING SKILLS** **Note making** Identifying important information in written texts Making notes in point format	04	**10marks= 20%**
3	**DEVELOPING WRITING SKILL** **Information transfer and interpretation of Visual or verbal information** **Investigative report** **Writing Job Application and Resume** **Formal Letters and E-Mails** **Letter Placing Order**- Placing order for product with particular specifications **Letter of Complaint**- Complaining about product or services	12	**30 marks =60%**
4	**CONSOLIDATING SPEAKING SKILLS** **Oral Presentation** **Interview Techniques and mock interviews** **Group Discussion**	08	***--**

REFERENCES

1.	Moghe, Rakhi et.al. *Developing English Language Skills.* Ahmedabad: Gujarat Technical Publishers.2016.
2.	Board of Editors. *Written and Spoken Communication in English*. Hyderabad: University Press(India) Pvt. Ltd. 2007.
3.	Dr.Prasad, P. *The Functional Aspects of Communication Skills*. New Delhi: Katson Publication.2008.
4.	Patil, Z.N.Valke,B.S. Thorat, Ashok. Merchant, Zeenat. *English for Practical purposes*. Chennai: Macmillan India Ltd. 2006.

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Bridge Course offering to SY Diploma Mechanical Students (Lateral Entry, CtoD)

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Year: I	**Bridge Course of Engineering Drawing (MEC3225)**	MARKS	100
Semester: II		HOURS	60
Course Outcomes	CO1 Interpret and draw orthographic and sectional orthographic views from isometric views and isometric views from orthographic views. CO2 Understand application of engineering curves and its construction. CO3 Draw the projections of points, planes and solids under different conditions. CO4 Apply the concept of projection of solids to draw section in various solids with its true shape and apply the concept of surface development in sheet metal work. CO5 Identify, understand and draw various fasteners & joints used in engineering applications.		

Unit No.	Content	Contact Hours	Theory Marks
UNIT-I	ORTHOGRAPHIC PROJECTIONS AND SECTIONAL ORTHOGRAPHIC VIEWS IN FIRST AND THIRD ANGLE PROJECTIONS.	14	24
UNIT-II	**ENGINEERING CURVES** Simple cycloid, Epi cycloid, Hypo cycloid, Parabola, Involute, Ellipse by concentric circle method, Arc of circle method, Rectangle method and Parallelogram method.	06	10
UNIT-III	**ISOMETRIC PROJECTIONS**	08	14
UNIT-IV	**PROJECTION OF PLANE AND LAMINA IN FIRST QUADRANT**	05	08
UNIT-V	**PROJECTION OF SOLIDS AND SECTION OF SOLIDS**	12	20
UNIT-VI	**DEVELOPMENT OF CUT SURFACE OF ALL TYPES OF SOLID**	08	14
UNIT-VII	**FREE HAND SKETCHES** A) Assembly of Hexagonal Bolt with Hexagonal nut and washer. B) Types of bolts and Nuts: Hexagonal headed bolt, Square headed bolt with square neck, T headed bolt with square neck, Cylindrical or Cheese headed bolt, Cup or Round headed bolt, hook bolt & Eye bolt and various types of nuts. C) Free hand Sketches of Collar stud, Square stud. D) Types of screw threads and its elements. (i) Square thread, ii) Acme thread, iii) Knuckle thread, iv) Sellers thread v) British association	07	10

	thread vi) With worth thread, vii) Triangular thread or V thread, viii) Unified thread, ix) Buttress thread. E) Shaft couplings F) i) Box or muff coupling, ii) Flanged coupling, iii) Protected type flanged coupling, iv) Universal coupling. g. Cotter joint, Socket spigot joint, Strap joint with gib and cotter, pin or knuckle joint, cotter joint with sleeve		

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1.	Text book of Engineering Drawing – P.J. Shah
2.	Text book of Engineering Drawing – N.D. Bhatt & V.M. Panchal

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