First Year, First Semester Diploma Mechanical Engineering

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

First Semester First Year Diploma Mechanical			
Year: I	**ENGINEERING DRAWING-I (MEC 3108)**	MARKS	100(T)+25(TW)
Semester: I		HOURS	45(L)+60(P)=105
Course Outcomes	CO1 Use Drafting instruments and Construct polygons, circles and lines with different geometric conditions. CO2 Interpret and draw orthographic views from isometric views. CO3 Understand the application of engineering curves and its construction. CO4 Draw the projection of points, lines, planes and solids under different conditions. CO5 Identify, understand and draw various fasteners & joints used in engineering applications.		

Unit No.	Content	Contact hours	Theory Marks
UNIT-I	Orthographic projections in first and third angle projections	07	20
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	08	20
UNIT-III	Projection of Straight line	09	20
UNIT-IV	Projection of Plane and Lamina	07	14
UNIT-V	**Projection of Solids** Cone, Cylinder, Pyramid: Triangular, Square, Pentagonal, Hexagonal. Prisms: Triangular, Square, Pentagonal, Hexagonal. Frustum: Cone, Pyramids.	08	16
UNIT-VI	**Free hand Sketches** 1. Assembly of Hexagonal Bolt with Hexagonal nut and washer. a. Types of bolts: 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. b. Types of nuts: Hexagonal nut, Square nut, Flanged nut, Cap nut, Dome nut, Ring nut, Wing nut, Capstan nut.	02	04
UNIT-VII	**Free hand Sketches** 2. Studs and Screws a. Types of Studs: Collar stud, Square stud. b. Types of Set Screw: Round or cup headed, cylindrical or cheese, countersunk, socket, Hexagonal headed, Square headed. End of Screws: Oval, Conical, Flat, Cap, Half dog, Full dog.	02	02
	Free hand Sketches:	02	04

UNIT-VIII	a. Types of rivets: Snap, Pan, Conical, Countersunk, Fillister, Rounded Countersunk, Ellipsoid. b. Types of riveted joints: 1. Lap joint: (I) Single riveted lap joint, (ii) Double riveted lap joint, (iii) Double riveted (chain type) lap joint, (iv) Double riveted (Zigzag type) lap joint. 2. Butt joint: (I) Single riveted single cover, (ii) Single riveted double cover (iii) Double riveted single cover, (iv) Double riveted double cover butt joints.		

REFERENCES	
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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Year: I	**WORKSHOP PRACTICE-I (MEC3110L)**	MARKS	50 (TW/PRA)
Semester: I		HOURS	30(P)
Course Outcomes	CO1 Identify needs of safety precautions, safety aids and first aids during workshop practice. CO2 Use of measuring instruments, cutting, finishing, bending, hammering tools and work holding devices to produce specific job. CO3 Perform cutting, marking and finishing operations in fitting and carpentry work. CO4 Perform cutting, marking, bending, joining and plumbing operations in smithy and sheet metal work.		

(Competency: Legends C: Cognitive A; Affective P: Psychomotor)

Sr. No.	Practical Content	Contact hours	Competency
1	Familiarization with basic usual working procedure and practices in a workshop including procedure about safety-clothing-first aid etc.	**02**	**C, A**
2	**CARPENTRY SHOP** i) Identification, correct method of handling and using, all hand tools and measuringinstruments. ii) Basic wood working operations. One job is to be set which will include the practice of all basic operation.	**06**	**C, P**
3	**FITTING SHOP** i.Identification, correct method of handling and using, all hand tools and measuring Instruments. ii.Basic fitting operations. One job is to be set which will include the practice of all basic operation.	**06**	**C, P**
4	**SMITHY SHOP**		

	i.Identification, correct method of handling and using, all smithy tools and measuring instruments. ii. Basic black smith operations. One job is to be set which will include the practice of all basic operation.	**06**	**C, P**
5	**TIN SMITHYAND PLUMBING** i) Identification, correct method of handling and using Tools. ii) Basic operations such as cutting, bending, joining, soldering brazing, etc. One job is to be set which will include the practice of all basic operation.	**06**	**C, P**

Sr. No.	**Title of Books**	**Authors**
1.	All about machine tools	Gerling
2.	Workshop Practice	Swarn Singh
3	Workshop Technology-I	S P Chandola
4	Westermann Tables	

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Year: I	**COMMUNICATION SKILL-I (ENG3106)**	MARKS	50
Semester: I		HOURS	30
Course Outcomes	CO1 Use appropriate grammatical concepts in sentences CO2 Develop vocabulary through reading and comprehend the main idea CO3 Compose structured write ups with proper cohesion and coherence CO4 Communicate effectively in formal/official writing in English CO5 Participate in formal and informal conversations.		

Unit No.	**Topic/Unit**	**Contact Hours**	**Theory marks**
1	**STRENTHENING GRAMMAR** Articles, Prepositions, Verbs, Tenses, Adjectives, Concord, Error Analysis	07	10
2	**DEVELOPING READING SKILLS** **Reading Comprehension** Developing Vocabulary through Derivation, Conversion and Compounding From a seen/unseen passage write single and multiple sentence answers	08	15
3	**DEVELOPING WRITING SKILL** **Paragraph Writing** Sentence linkers and supporting sentences, Identification and organization of paragraph types, Guided compositions	10	20

	Writing Letters and Report **Technical report** Reporting workshop jobs- Carpentry, Fitting, Smithy, Tin Smithy **Letter seeking Permission and Request letter** **Letter of Inquiry**		
4	**CONSOLIDATING SPEAKING SKILLS** **Dialogue Rendering and Writing** Greeting and taking leave, Introducing self and others Congratulating and Inviting, Expressing sympathy and offering condolences	05	05

REFERENCES

1.	Moghe, Rakhi et.al. *Developing English Language Skills.* Ahmedabad: Gujarat Technical Publishers.2016.
2.	Das, Bikram K. *Functional Grammar and Spoken and written Communication in English—ELT—A student-friendly edition.* Kolkata: Orient Blackswan. 2008
3.	Rajeevankaral. *Oxford English grammar just for you*. Oxford.2014
4.	Achar, Deeptha.Barrett, Rajan Dash, Santosh Jain, Charul. Ketkar, Sachin. Mujumdar, Aarti. *English for Academic Purposes Book I* Gujarat: University Granth Nirmaan Board.2011.

The Maharaja Sayajirao University of Baroda
Polytechnic,
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Year: I	**APPLIED PHYSICS – I (APH3108)**	MARKS	50(T)
Semester: I		HOURS	30(T)+30(P)
Course Outcomes	CO1 Understand basic concepts of physics, related to system of units, scalar-Vector quantities and types of errors in measurement & its estimation. CO2 Apply the Newton's laws of motion in engineering applications and understand the types of forces and energy in mechanics. CO3 Understand the Concepts of electricity, magnetism and its applications. CO4 Gain the knowledge of semiconductors, it's types and the application as a PN junction diode.		

UNIT NO.	TOPIC	Contact Hours	Theory Marks
1	**Introductory Concepts** SI system of Units, Errors of measurement, Types of errors, Estimation of errors, Vectors and scalars quantities, Unit vector, and resolution of vectors, scalar and vector products. law of parallelogram (qualitative only)	05	10
2	**Mechanics**	07	

	Concept of force, Newton's laws of motion, Uniform circular motion, centripetal force, concept of momentum and its conservation, angular displacement; velocity; angular momentum, torque, conservation of angular momentum, types of forces: friction, Hooke's law, tension force, spring force, gravitation and their applications, Work and its units, concept of energy, kinetic and potential energy, work-energy theorem, conservative and non-conservative forces, rotational energy and the concept of moment of inertia, conservation of energy, equivalence of mass and energy-Einstein's formula, collisions, elastic and inelastic collisions, power		11
3	**Electricity and magnetism** Coulomb's law, electric Field, electric potential, application for single charge and dipole, Gauss' law and its applications, Concept of magnetic field, Ampere's circuital law and its applications(wire, solenoid, toroid), Lorentz force, Faradays law of electromagnetic induction, experiments, Lenz law, self and mutual induction	07	11
4	**Current Electricity** Electric current, Ohm's law, resistance, combination of resistances, resistivity, capacitors, parallel plate capacitor, energy stored in capacitor, energy dissipated in resistor, Kirchhoff's laws, heating effect of electric current, Wheatstone bridge	07	11
5	**Semiconductor Physics** Conductors, insulators and semiconductors, types of semiconductors, n-type and p-type semiconductors, p-n junction diode and its characteristics, types of diodes and their applications	04	07

References

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.

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Year: I	**APPLIED CHEMISTRY – I (ACH3109)**	MARKS	50(T)
Semester: I		HOURS	30(L)+30(P)

Course Outcomes

CO1 Analyse hardness of water, disadvantages and removal by various softening methods used in industry.
CO2 Understand basic concepts of air, water, soil, noise pollution and corrosion.
CO3 Learn and evaluate the concept of solution, pH, Volumetric analysis, solubility and solubility product.
CO4 Recognize and analyse the electrochemical processes.

	CO5 Quantify the amount of solute in a solution through experiments conducted in laboratory.

UNIT NO.	TOPIC	Contact Hours	Theory Marks
1	**Water and its treatment** Impurities in water, types of water; types of hardness; bad effects of impurities in water used for industrial purpose; methods of treatment: boiling; Clark's methods: calagon method: zeolite method; ion-exchange method; estimation of hardness by EDTA method; commercial measurement of total dissolved solid in water by TDS meter.	5	9
2	**Environmental Pollution & its control** Types of pollution: air, water, soil and noise pollution; causes of pollution; prevention and control of pollution; introduction to green chemistry.	5	7
3	**Basic introduction to solution, pH value and volumetric analysis** Define solution; hydrogen ion concentration;define pH with examples; buffer solutions; types of buffer solutions; indicators, choice of indicators for titration; volumetric analysis, types of titration acid-base & redox titration; define molarity, normality, molality	5	9
4	**Solubility Product and its application** Define equilibrium, reversible and irreversible reaction, law of mass action and equilibrium constant, LeChatelier's principle, effect of temperature, pressure &concentration. Define solubility and solubility product and ionic product, IP>K_{SP}, IP<K_{SP}, IP=K_{SP}, classification of solubility product from solubility. Limitation of solubility product concept, common ion effect, application of solubility product.	5	9
5	**Electrolysis and its applications** Define conductors, electrolytes and its type, ionization, Arrhenius theory of ionization, difference between ionization and dissociation; electrolysis and its mechanism with examples; electro chemical series; Faraday's 1^{st} and 2^{nd} law for electrolysis with examples; industrial applications of electrolysis.	5	9
6	**Corrosion and Protection of Metals** Corrosion, mechanism of corrosion; direct chemical process; electrochemical process, galvanic cell; and concentration cell action; pitting corrosion; corrosion of iron and aluminium; protection from corrosion.	5	7
REFERENCES			
1.	Polytechnic Chemistry by V.P.Mehta		
2.	A Text book of Engineering chemistry by M.M.Uppal		
3.	Inorganic Chemistry by P.L.Soni		

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First Semester First Year Diploma Mechanical			
Year: I	**ENGINEERING MECHANICS – I (APM3103)**	MARKS	100(T)+25(T.W)
Semester: I		HOURS	45(L)+30(P)
Course Outcomes	CO1 Describe the concept of Engineering Mechanics and recognize Principles of Engineering Mechanics in the various field of Engineering. CO2 Identify different types of forces and force system and solve numerical problems related to different force systems. CO3 Recognize the concept of the Centre of Gravity and Centroid of various sections and also compute the position for the same. CO4 Express the concept of frictional force and solve the problems related to frictional forces.		

Unit No.	Topic/Unit	Contact Hours	Theory marks
1	**INTRODUCTION** Mechanics-static and dynamics. System of units, S.I. Units, M.K.S. units, C.G.S. Units.	01	5
2	**GENERAL FORCE SYSTEM** Force as a vector, composition and resolution, transmissibility and super position	02	5
3	**COPLANAR CONCURRENT FORCE SYSTEM** Composition of forces, the law of parallelogram of forces, law of triangle of forces and law of polygon of forces. Resolution of a force system graphical method as well as analytical method of finding resultant. Coplanar-non-concurrent force system. Resultant of non-concurrent and non-parallel force system.	08	15
4	**EQUILIBRIUM OF FORCE SYSTEM** Lami's theorem, resultant and equilibrium of a parallel force system.	04	10
5	**COPLANAR PARALLEL FORCE SYSTEM** Parallel force system, resultant of a parallel force system, equilibrium of a parallel force system. Reaction's on the supports of beam and trusses.	07	15
6	**MOMENT OF A FORCE AND COUPLE** Moment and couple their destination, properties of a couple.	02	5
7	**COPLANAR, NON-CONCURRENT AND NON-PARALLEL FORCE SYSTEM** The resultant by analytical method and graphical method use of funicular polygon for locating resultant.	06	15
8	**CENTER OF GRAVITY AND CENTROID** Center of gravity and centroid, centroid of thin Laminas of regular shapes, Analytical as well graphical method, Center of gravity of solid and hollow regular shaped bodies, stable unstable and neutral equilibrium, centroid of composite laminas and composite solid bodies.	07	15
9	**FRICTION** Angle of friction, angle of repose, limiting equilibrium, limiting friction, coefficient of friction and laws of friction. Static dynamic rolling friction and sliding friction. Friction along various planes, condition of minimum efforts, study of wedges screws and rolling contacts.	08	15

REFERENCES

1. Engg Mechanics - Dadhe & Jamdar

2.	Engg Mechanics - R.S. Khurmi
3.	Engg Mechanics - R.C.Patel (Vol-I&II)
4	Engg Mechanics- S.B Junarkar & H.J Shah.

<table>
<tr><td> 
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<tr><td colspan="4">First Semester First Year Diploma Mechanical</td></tr>
<tr><td>Year: I</td><td rowspan="2">APPLIED MATHEMATICS – I (AMT3104))</td><td>MARKS</td><td>100(T)+25(TU/ TW/VIVA)</td></tr>
<tr><td>Semester: I</td><td>HOURS</td><td>60(T)+15(Tutorial)</td></tr>
<tr><td>Course Outcomes</td><td colspan="3">CO1 Recall, extend and perceive the important elements of Algebra viz., Logarithms, Partial Fractions, Quadratic equations, progressions, binomial theorem and complex numbers.
CO2 Evaluate the limits, examine the continuity at a point for functions of one variable and Find their derivatives using appropriate methods
CO3 Interpret the geometrical meaning of derivative and apply the knowledge of derivatives in different engineering/physical problems. and also determine partial derivatives of functions and make their use in finding approximate values and maxima-minima of function of two variables.
CO4 Demonstrate and explain the basic concepts of two dimensional co-ordinate geometry viz., straight line and circle
CO5 Recall, infer and evaluate examples based on the concept of trigonometry and the properties of triangles.</td></tr>
</table>

Unit No.	Content	Contact hours	Theory Marks
UNIT-I	**Algebra** Logarithm-Introduction, Rules of logarithm and Examples. Partial fractions: Introduction, Proper and Improper fractions Quadratic Equations: Nature of roots of quadratic equations Geometric Progressions: Definition, general term and sum of first n terms of geometric progressions, geometric mean	07	14
UNIT-II	**Functions, Limits, Continuity and Differentiation** Concept of Limit, Standard Limit, different methods to evaluate limits and continuity of function of one variable, Definition of derivative, differentiation of standard functions by first principle, Rules of differentiation, Differentiation of algebraic, trigonometric, exponential, logarithmic, implicit functions and composite functions, Higher order derivatives, Leibnitz's Theorem	14	33
UNIT-III	**Applications of differentiation**	14	

	Geometrical interpretation of derivative, Tangent and Normals, Maxima and Minima, Approximate value, Radius of curvature **Partial Differentiation and its applications** Functions of two variables , Definition of partial derivatives, Chain Rule, Euler's Theorem, Implicit functions and Differentials, Applications (Approximations, Maxima And Minima).		15
UNIT-IV	**Co-ordinate Geometry** Reorientation, Point, Collinearity, Line, Inclination and slope of a line, different forms of equations to a straight line (i) Slope-intercept form (ii) Point-slope form (iii) Two-point form (iv) Intercept-form. General equation of a Straight line, Family of lines. Conditions for concurrency of lines. Definition, Equation of a circle with given center and radius, General form of equation of circle, Equation of a circle when intercepts are given, circle passing through three points, Equation of chord, Equations of tangents and normal at a point on a circle.	06	12
UNIT-V	**Trigonometry** (Trigonometric functions as circular functions), Addition and Factor formula, Trigonometric functions of multiple and submultiples angles. Introduction of inverse trigonometric functions. **Properties of Triangle** Sine formula, Cosine formula, Projection formula, Napier's analogy, Half-Angle formulae.	07	20
UNIT-VI	**Complex Numbers and Binomial Theorem** Definition, operation, properties, cartesian and polar forms, De'Moivre's theorem and its application Binomial Theorem: Introduction, Development of Binomial expansion	06	06

REFERENCES

Basic Engineering Mathematics Semester I by G.V.Kumbhojkar , Mrs. R.P.Kumbhojkar, Phadke Prakashan, Kolhapur (20th Edition)

Engineering Mathematics Semester II (Common to all branches) by G.V.Kumbhojkar , Mrs. R.P.Kumbhojkar, Phadke Prakashan, Kolhapur (20th Edition)

Polytechnic Mathematics (Made Easy) (Applied Mathematics) by Manjeet Singh , Dhanpat Rai & Co. (P) Ltd. (Edition 2004)

Mathematics for Polytechnic students, First Semester, by S. P. Deshpande, Pune Vidyarthi Gruha Prakashan. (For Diploma Students).

Elementary Engineering Mathematics by B. S. Grewal, Khanna Publishers

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

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Year: I	**Bridge Course of Applied Mathematics & Engineering Mechanics (MEC3117):**	MARKS	100(T
Semester: I		HOURS	45(AM)+30(EM)
Course Outcomes	CO1 Understand basic units and different force system. CO2 Describe friction and engineering application CO3 Associate and compute the concepts of velocity ratio for lifting machine and its linear law CO1 Evaluate the limits, examine the continuity at a point for functions of one variable CO2 Recall, infer and evaluate examples based on the concept of trigonometry and the properties of triangles. CO3 Find the derivatives of functions of one variable using appropriate methods CO4 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.		

Unit No.	Content	Contact hours	Theory Marks
UNIT-I	**CONCEPT OF FORCES** SI units, Force formula by kinetic composition and resolution of force, Equilibrium of force system	15	20
UNIT-II	**FRICTION** Friction and its engineering application	8	15
UNIT-III	**SIMPLE LIFTING MACHINE** Velocity ratio, Linear law	7	15

Unit No.	Content	Contact hours	Theory Marks
1	Limits. Continuity (functions of one variable)	04	10
2	**Reorientation (Trigonometric functions as circular functions)** Addition and Factor formula, Trigonometric functions of multiple and submultiples angles.	08	10

3	**Differentiation** Definition of derivative, differentiation of standard functions by first principle, Rules of Differentiation, Differentiation of algebraic, trigonometric, Exponential, Logarithmic functions	08	15
4	Indefinite Integrals: Standard formulae, Integration by substitution, Integration by Algebraic functions, Integration by parts, Trigonometric substitutions, Integration by the method of partial fractions, Trigonometric substitutions	10	15

REFERENCES

1.	Basic Engineering Mathematics Semester I by G.V.Kumbhojkar , Mrs. R.P.Kumbhojkar, Phadke Prakashan, Kolhapur (20th Edition)
2.	Engineering Mathematics Semester II (Common to all branches) by G.V.Kumbhojkar , Mrs. R.P.Kumbhojkar, Phadke Prakashan, Kolhapur (20th Edition)
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