VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E. Mechanic Engineering

Semester - III

SYLLABUS OF THIRD SEMESTER

Teaching Scheme			Theory Examinations		Practical / Term work / Sketching / Viva / Quiz			
Subject	**Subject Code**	**L T P (Hrs)**	**Duration (Hrs)**	**Marks**	**Tutorial**	**Cont. Evaluation**	**Exam. (Pract)**	**Total Marks**
Theoryof Machine - I	MED301MP	3 0 2	3	100	00	20	30	50
Machine drawing	MED302MP	1 0 4	3	100	00	20	30	50
Mechanics of Solids- I	MED303MP	3 0 2	3	100	00	20	30	50
Mechanical Technology-I	MED304MP	3 0 4	3	100	00	40	60	100
Mechanical Measurements	MED305MP	3 0 2	3	100	00	20	30	50
Industrial Organization Maintenance & Safety	MED306MP	3 0 0	3	100	---	---	---	---
TOTAL		16 0 14		600	00	120	180	300
Total Contact Hours = 30			**Total Mark = 900**					

VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E. Mechanic Engineering
Semester - III

MED 301 MP Theory of Machines - I			
	Lectures	**Tutorial**	**Practical**
Teaching Hours	3	-	2
Examination Scheme Marks	100	00	Continuous Evaluations 20 Examination 30

1. **MECHANISMS AND MACHINES :** Introduction, Mechanism and machine, Rigid and Resistant body, Link,Kinematic pair, Types of motion, Degrees of Freedom (Mobility), Classification of Kinematic pairs, kinematic Chain,Linkage, Mechanisms, Kinematic Inversion, Inversions of Slider-Crank Chain, Double Slider-Crank Chain, Problems.
2. **VELOCITY ANALYSIS :** Vetors, Displacement of a Rigid Body, Relative Displacement, Definition of Velocity, Angular Velocity, Rotation of a Rigid Body, Translation and Rotation of a Rigid Body, Relative Velocity Method (Graphical and Analytical), Instanteneous Axes of Motion, Properties of Instantaneous centers, the Aronhold-Kennedy Theorem of Three centers, Velocity Analysis by Instantaneous Centres. The Line-of-Centres method, The Link-to-Link Method, Velocity Analysis by Components, Velocity Images, Velocity Diagrams.
3. **ACCELERATION ANALYSIS :** Definition of Acceleration, Angular Acceleration, A General Case of Acceleration, Radial and Transverse Components of Acceleration, The Coriolis Component of Acceleration, Examples of Acceleration Analysis, Acceleration Diagrams, Computer-aided Kinematic analysis of Mechanisms like slider-crank Mechanism, Four-bar Mechanism etc.
4. **BELTS, ROPES & CHAINS :** Introduction, Belt and Rope Drives, Open and Crossed Belt Drives, Velocity Ratio, Slip, Materials for Belts and Ropes, Law of Belting, Length of Belt, Ratio of Friction 9 Driving) Tensions, Power Transmitted, Centrifugal, Effect on Belts, Mamimum power Transmitted by a Belt, Initial Tension, Creep, Chains, Chain length, Angular speed Ratio, Classification of Chains.
5. **GEARS & GEAR TRAINS :** Introduction, Classification of Gears, Gear terminology, Law of Gearing, Velocity of Sliding, Forms of teeth, Cycloidal Profile teeth, Involute profile teeth, Bath of Contact, Arc of contact, Number of pairs of teeth in contact, Interference in Involute gears, Minimum Number of teeth, Interference Between Rack and pinion, Undercutting, Comparison of Cycloidal and Involute Tooth Forms, Introduction to Helical, Spiral, Worm, Worm ,Gear and Bevel Gears.
6. **CAMS :** Introduction, Types of Cams, Types of followers, Cam Terminology, Displacement Diagrams, Motions of the Follower, Graphical Construction of Cam profile.

REFERENCES :

1. Shigley, J.E. and Uicker, J.J., : Theory of Machiness and Mechanisms, McGraw Hill International Book C0., 1980.
2. Rattan, S.S. : Theory of Machines, Tata Mc Graw –Hill, Publishing Co., Ltd., New Delhi, 1984.
3. Rao, J.S., and Dukkipati, R.V. : Mechanism and Machine Theory, Wiley Eastern Ltd., 1992.
4. Mabie, H.H. and Ocvirk, F.W. : Kinematics and Dynamics of Machinery, 3rd Ed., John Wiley and Sons Inc., 1978.
5. Green, W.G. : Theory of Machines, 2nd Ed., Blackie, London, 1992.
6. Hollowenko, A.R. : Dynamics of Machinery, John Wiley and Sons Inc., New York, 1955.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
B.E. Mechanic Engineering
Semester - III

MED 302 MP Machine Drawing			
	Lectures	**Tutorial**	**Practical**
Teaching Hours	1	-	4
Examination Scheme Marks	100	00	Continuous Evaluations 20 Examination 30

1. Screw Threads and Screwed Fastenings.
2. Riveted Joints, Pin Joints, Keys and Cutter Joints,
3. Welded Joints.
4. Shaft Couplings.
5. Shaft Bearings, Brackets and Hangers.
6. Pulleys.
7. Pipe Joints.
8. Engine Parts : Stuffing Box, Cross Head, Connecting Roads, Cranks, Eccentric etc.

TERM WORK : Each Student shall Submit a Set of Drawing Sheets and Sketch Book Based on the above Syllabus.

REFERENCES :

1. K.R. Gopala Krishna : Machine Drawing, Subhas Publishers, 1995.
2. N.D. Bhatt : Machine Drawing, Charatar Publishing Houses, 1995.
3. Sidheswar : Machine Drawing, Tata Mc Graw Hill, 1996.
4. R.K. Dhawan : Machine Drawing, S. Chand & Company Ltd., 1996.
5. G.R. Nagpal : Machine Drawing, Khann and Publishers, 1994.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E. Mechanic Engineering

Semester - III

MED 303 MP Mechanics of Solids			
	Lectures	**Tutorial**	**Practical**
Teaching Hours	3	-	2
Examination Scheme Marks	100	00	Continuous Evaluations 20 Examination 30

1. **SIMPLE STRESSES AND STRAINS :** Introduction concept of "Stress" –different types of stresses- elasticity – Hook's law – stress – strain diagrams for M S and CI – Working stress – factor of safety boisson's ratio- Lateral strains- Volumetric strain Ears of varying cross section - –Elongation due to half weight – Bar of Uniformly tapering section – Bars of composite materials. Relation between Modulus of Elasticity (E), Modulus of Rigidity (G) and Bulk Modulus (K) – Thermal stresses and strains.
2. **SHEAR FORCE DIAGRAMS (SED) AND BENDING MOMENT DIAGRAMS (DMD) :** Deam Types of beams statically determinate and statically indeterminate beams. Types of supports Types of loading – shear force- Bending Moment arrival force Relation between shear force and Bending moment. Simply supported beams – cantilever Beams over hanging beams – point of contra flexure – varying distributed loads moments and couples inclined loads sinusoid loading.
3. **STRESSES IN BEAMS :** Bending stresses in beams Theory of pure bending assumptical Moment : of Resistance –Section Modulus- Shearing stresses in beams – Theory of shear stress – shear variation for rectangular, circular, I- Section. T- Section, Channel section etc.- Beam of Uniform strength – Flitched Beams.
4. **SPRINGS :** Different types of springs, close coiled and open coiled helical springs, close coiled helical springs subjected to axial load and axial twistaleaf springs or carriage springs – semi elliptical type and quarter elliptical type – springs in series and spring in parallel.
5. **TORSION :** Torsional stresses- Theory of pure torsion-polar moment of inert power transmitted by a circular shaft and hollow shaft-Replacing a shaft – Composite shaft – shaft of varying cross section- combined bending and torsion.
6. **PRINCIPAL STRESSES AND STRAINS :** Tangential strain Normal strain Principal planes- Principal stress Principal strains – Analytical methods for stresses on an oblique section of a body subjected to direct stress and shear stress- Mohr's circle graphical method for principal stresses.
7. **COLUMN AND STRUTS :** Column and strut- Types of columns – and conditions – Euler's column Theory – different cases in Euler's Theory –Limitations of Euler's Theory –Rankine's formula-Johnston's parabolic formula-Indian standard code formula.
8. **THIN AND THICK CYLINDERS :** Cylindrical shells – distinguish between Thin cylinders and cylinders – circum- ferential stresses- Longitudinal stresses – Radial stresses – Thin cylinders subjected to internal presure –wire would Thin cylinders – Thin spherical shells. Thick cylinders – Lame's Theory for thick cylinder – stresses in compound Thick cylinders.
9. **STRAIN THEORY :** Strain Energy- Resistance –proof Resistance Modulus of Resistance strain energy due to gradually applied load- strain energy due to suddenly applied load – impact loading – strain energy due to freely falling weight –strain energy due to shear –strain energy due to torsion –strain energy due to bending.

10. **MECHANICAL PROPERTIES OF MATERIALS :** Plastic materials-plastic materials –Ductils materials-brittla materials –Impact test – Fatigue test – Endurance Limit – Toughness – Hardness – creep.

PRACTICALS : Eight Practicals based on above courses work :

1. Tension Test on M.S. and CI specimens.
2. Torsion Test on M.S. specimens.
3. Charpy Impact Test.
4. Transvers Test on Wooden beam.
5. Compression Test on CI Columns.
6. Springs in parallel.
7. Shear strength Test.
8. Hardness Test (Demonstration only)
9. Strain gauge technique.

TUTORIALS : Atleast 35 problems based on above course work.

REFERENCES :

1. Elements of strength of Materials (Tata Mc Graw Hill) –S Timoshenko D.H. Young
2. Mechanics of Materials (Charotar Publi) – S.B. Junnarkar H.J. Shah
3. Strength of Materials (ELSS)
4. Introduction to Mechanics of Solids (Prentice Hall Buck) – E.P. Popov – I.P. Mapila – S.M. Agnihotri
5. Strength of Materials and Theory of structures. – Dr. B.C. Punamiya.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E. Mechanic Engineering

Semester - III

MED 304 MP Mechanical Technology - I			
	Lectures	**Tutorial**	**Practical**
Teaching Hours	3	-	4
Examination Scheme Marks	100	00	Continuous Evaluations 40 Examination 60

1. **CASTING :** Introduction, Casting Terms : Patterns, Allowances, Types of patterns, Moulding Materials, Properties and Testing Cores, Types, Chaplets, CO2 Moulding Gating & Rising System, Definitions, Elements, Pouring time & chock Area Calculations, Spure, Ingates, Gating Rations, Trapping of Slag, Riser Designing, Caine's Method, Modules, NRL Method, Numericals of Riser Design, Feeding Distances, Melting, Cupola, Charge Calculations, Cleaning of Casting, Defects in Castings, Product Design, Special Casting Processes, Shell Moulding, Die Casting Investment Precision Casting, Permanent Moulding, Centrifugal Casting.
2. **METAL WORKING :** True Stress, True Strain, Plastic Deformation, Hot Working, Hot Working Temperatures, Cold Working. Rolling, Principle, Equipment, Angle of Bite, Calculation for slip. Forging, Principle, Flow Stresses, Strain, Extrusion, Principle, Hot & Cold Extrusion, Wire Drawing, Principle, Tube Drawing, Sheet Metal Working, Definitions of Various Operations like Shearing, Blanking, Plercing Trimming, Shaving etc., Forging Hammer's and Presses.
3. **GAS WELDING :** Principles, Types of gases used, Types of Flames, Welding Techniques, Edge Preparation. Equipment, Torch, Regulators, Welding Filler Rods, Gas Cutting, Principles Position of Torch, Precautions and Safety.
4. **ELECTRIC ARC WELDING :** Principles, A.C./D.C. Welding, Edge Preparation, Equipment, A.C./D.C. Machines, Welding Electrodes, Types, Designation and Selection, Manual Metal Arc Welding, Carbon Arc Welding, Inert Gas Shielded Arc Welding, TIG & MIG, Submerged Arc Welding, Atomic Hydrogen Arc Welding, Plasma Arc Welding, Stud Arc Welding, Arc Cutting.
5. **RESISTANCE WELDING :** Principles, Heat Balance, Electrodes, Spot Welding, Seam Welding, Projection Welding, Upset Welding, Flash Welding. Fusion Welding Processes : Thermit Welding, Electro Slag Welding, Electron Beam and Laser Beam Welding.

REFERENCES :

1. Manufacturing Technology, P.N. Rao, TMH Edition.
2. Principles of Metal Casting, Heine and Roshenthal.
3. Foundry Technology, Raghuvanshi.
4. Workshop Technology, Hajrachoudary.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E. Mechanic Engineering

Semester - III

MED 305 MP Mechanical Measurements			
	Lectures	Tutorial	Practical
Teaching Hours	3	-	2
Examination Scheme Marks	100	00	Continuous Evaluations 20 Examination 30

1. **BASIC CONCEPTS :** Concepts, Definitions of Terms, Calibration, Standards and units, Generalized block Diagrams of Measuring Systems, Input Output configuration of measuring systems.
2. **ERRORS IN MEASUREMENTS :** Types of Errors, Gross Errors, Systematic Errors, Random Errors, Central Value, Histogram, Deviation, Standard Deviation and Variance, Normal Distribution Curve, Probable Error.
3. **PRESSURE MEASUREMENT :** Types of Pressure measurement devices, Manometers, Dead Weight Tester, Bourdon Tube Pressure Gauge, Diaphragms and Bellows, Law Pressure Measurement, The McLead gauge, Pirani Thermal Conductivity Gauge, Knudsen Gauge, Ionization Gauge Selection of pressure Measuring Devices for Specific Applications Calibration of Pressure Measuring Devices.
4. **TEMPERATURE MEASUREMENT :** Temperature scales, Ideal Gas Thermometer, Temperature Measuring Devices, Bi –metallic Strip, Electrical Resistance Thermometer, Thermistors and Thermocouples, Laws of Thermocouples and their Applications, Construction and Calibration of Thermocouples, Radiation pyrometers, Total Radiation Pyrometers, Temperature Measurements in high speed flow.
5. **FLOW MEASUREMENTS :** Flow Measurement by Drag Effects, Rotameter, Hot Wire Anemometers, Magnetic Flow Meters, Flow Visualization Techniques, Shadowgraph, Interferometer, Laser Doppler Anemo-meter, Pitot Tube, Constructional features, Calibration, Obstruction meters, Orifice, Venturi Nozzle and their calibration.
6. **FORCE, TORQUE AND SPEED MEASUREMENTS :** Basic Methods of Force Measurements. Scales and Balances, Elastic Sensing Elements, Measurements of Torque of on Rotating Shaft, Stress and Strain, Strain Measurements, Measurements of Strain Gauge Outputs, Electric Resistance Strain Gauges, Strain Gauge, Rosettes, Speedometer and Stroboscope, Power Absorbing and power Transmitting Dynamometers, Proney Brake and Eddy Current Dynamometers. Ballast Circuit, Wheatstone Bridge, Gauge Factor, Temperature Compensation.
7. **MISCELLANEOUS MEASUREMENTS :** Measurements of Motion and Vibration, Principles of Seismic Instrument, Sound Level Meter, Measurements, of pH Value, Gas Analyser, Introduction to Air Pollution Sampling and Measurement, Unit of Pollution. Measurement, Air Pollution Standard, Gas Sampling Techniques, Combustion Products Measurements.

REFERENCES :

1. Holman J.P. : Experimental Methods for Engineers, McGraw-Hill (International Ed.) Book Company, New Delhi, (1989).
2. A.K. Sawhney : A Course in Mechanical Measurements and Instrumentation, Dhanpat Rai and Sons, Delhi, (1989).
3. Doeblin, E.O., : Measurement Systems, Application and Design, 2nd edition, McGraw Hill Book Company, New York, 1975.
4. Beckwith, T.G., and W.L. Buck : Mechanical Measurements, 2nd Edition, Addison Wesely Publishing Company, Inc., Reading, Mass., 1969.
5. B.E. Jones : Instrumentation, Measurement and Feedback, McGraw Hill Co., Ltd., New Delhi.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
B.E. Mechanic Engineering
Semester - III

MED 306 MP Industrial Organization, Maintenance & Safety			
	Lectures	**Tutorial**	**Practical**
Teaching Hours	3	-	-
Examination Scheme Marks	100	00	Continuous Evaluations 00 Examination 00

1. **INDUSTRIAL ORGANIZATION :** Basic concept of Industrial Organization, objectives of business, forms of business organization, Industrialization in India, Industrial finance, principle of scientific management.
2. **FACTORY ORGANIZATION & MANAGEMENT :** Nature & Scope of factory management plant location, factory building, Lay out, Automation.
3. **MAINTENANCE :** Types of maintenance & their applications, organization of maintenance department, Industrial maintenance documentation & Computer application, methods of costing, depreciation etc.
4. **INDUSTRIAL SAFETY:** General safety rules, safe guards, factory acts, procedure for handling & repairing accident cases, first aid treatment, function of safety personnel, general safety precautions.

REFERENCES :

1. S.A. Sharlekar, C. Mallikharjuna & Rao, "A text book on Industrial organization & management", (Himalaya publishing house- B'bay) 1994.
2. G. Aswathappa, "Factory Organization & management", (Himalay publishing house-B'bay) 1990.
3. H.P. Garg, "Industrial maintenance", (S. Chand & Co. Ltd. Delhi) 1990.
4. Anthony Kelly, "Maintenance planning & Control", 1984.