

B. E. SEMESTER-III PRODUCTION.
301 : MATHAMATICS-III

Teaching Scheme		Examination Scheme				
Hours per Weeks		Theory		Pract./Oral mark	Term work marks	Total Marks
Theory	Pract.	Marks	Hours			
3	-	100	3	-	-	100

1. Ordinary Differential Equations of Higher Order:

Definition, complete solution, Operator D, Complementary function, inverse operator, Rules for finding particular integral, Cauchy's and legendre's linear equations, simultaneous linear equations with constant coefficients. Application to eng. problems such as deflection for beams, electrical circuits, forced damped oscillations.

2. Fourier Series:

Eular's formula, Direchlet's conditions, functions having points of discontinuity change of interval, expansion of odd or even periodic functions, half range series.

3. Laplace Transform :

Introduction, transform of elementary functions, properties of L. T., existence condition, Inverse transform, transform of derivatives transform of integrals, multiplication by t^n , division by t , convolution theorem, application to solution of differential equations.

4. Series solution of differential equation of the type

$$P_0 \frac{d^2y}{dx^2} + P_1 \frac{dy}{dx} + P_2 y = 0$$

5. Partial Different equations with Application:

Formation by elimination of arbitrary constant and arbitrary function, particylar and complete integral, equations solvable by direct integration linear equatins of frist order, non-linear equations of frist order, Homogeneous linear equation with constant coefficients, mehtod of sepration of variables. Boundary value problems, vibrations of a stretched string, One dimensional heat flow.

6. Statistics:

Poisson and Normal Distribution, Curve fitting and regression,

REFERENCE BOOKS:

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|---|-----------------------|
| 1. Higer Engg. Manthematics | By Dr. B. S. Grewal. |
| 2. Engg. Manthematics I & II | By Shanti Narayan. |
| 3. Mathematics of Engineers | By Chandrika Prashad. |
| 4. Advanced Mathematics for Engineerers | By Chandrika Prashad. |
| 5. Applied Mathematics I & II | By P. N. Wartikar, |
| | By J. N. Wartikar. |
| 6. Engg. Mathematic Vol. II ,III | By G. V. Kumbhojkar. |

B. E. SEMESTER-III MECHANICAL PRODUCTION.
302 :ELECTRICAL TECHNOLOGY

Teaching Scheme		Examination Scheme				
Hours per Weeks		Theory		Pract./Oral mark	Term work marks	Total Marks
Theory	Pract.	Marks	Hours			
3	02	100	03	25	25	150

- D. C. Machines:**
 Constructional features, EMF equation characteristics of D. C. shunt, series and compound generation. Armature Reaction, commutation.
Motor: Operation, Torque, Equation, Characteristics of shunt, Series and compound motor, Losses and efficiency in D. C. Machines.
 Starting, speed control by rectifier and application of D. C. Motors.
- A. C. Machines:**
(I) Alternators and Synohronous Motors:
 General operation, constructional features EMF equations, Distribution and pitch factor, Synchronous impedance, Synchronizing, Methods of synchronizing, Basic principles of parallel operation.
 Construction, working principle, method of starting and application of synchronous motor.

(II) 3 - Phase Induction Motor:
 Type of induction motor production of rotating magnetic field, operation, Torque speed characteristics, Efficiency and application of squirrer cage and slipring induction motor.
 Starting and speed control of 3-0 induction motor.

(III) Single Phase Motors:
 Different type of single phase motor, construction, working, principle and applications of different type of single phase motor.
 Starter Dol/Star delta starters, Auto transformer starters.
- Transformers:**
 Constructional features, EMF Equations, Phase diagram on No-Load and load Regulation, Efficiency, Open circuit and short circuit test, Equivalent circuit, All-Day efficiency, Three phase transformer and Auto-Transformers.
- Electric-Driver:**
 Type of drive, selection of motor, starting characteristics , Running characteristics, Mechanical feature of electric motors, Transmission of drive, noise, size and rating, Temperatures rise of motor, Standard rating of motors, Load equalization, Fly wheel calculations. Selection of motor for A particular drives.
- Electrical Measuring Instruments:**
 Classifications, Primary and secondary instruments, indicating, Recording and integrating type of instrument. Operating torques, damping and controlling torques, torque weight ratio, Pointer and scales.
 Principle of operation, Construction, Errors, Calibration and areas of application of the PMMC, Moving iron, Induction, Thermal and electrostatic instrument, Power and energy measurement in poly phase circuits.
- Electro-Mechanical Components:**
 Relay/Contractor, O/L relay, MCBS, Limit switches, solenoids.

TERM WORK:

Term work will be based on the experiment on the above topics.

PRACTICAL/ORAL:

Practical/ Oral examination shall be conducted on the basis of theory and term work.

REFERENCE BOOK:

1. A text book of Electrical Technology Vol.- I, II, III. By: B. L Theraja.
2. Electrical and Electronic Measurement & Instrumentation By: A. K. Scrhncy.
3. Electrical Power By: S. L. Uppal.

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –III PRODUCTION ENGINEERING
P- 303 BASIC MACHINE TOOLS

Teaching Scheme		Examination Scheme				
Theory Hrs.	Practical Hrs.	Marks	Theory Hrs.	Practical/Oral Marks	Term work Marks	Total Marks
04	04	100	03	25	25	150

A. THEORY

1. BASIC MACHINE TOOLS

Machine tools classification, working and auxiliary motions in machine tools, Primary cutting motions in machines tools.

2. METAL CUTTING LATHES

Engine Lathes, construction all arrangement and principal units of engine lathes, type and size range of engine lathes, Operations carried on engine lathe , attachment extending the processing capacities of engine lathes, description of other types of lathes, Plain truing lathes, facing lathes, multiple tool lathes, simple purpose lathes, turret lathes, horizontal and vertical. Alignment tests of lathes.

3. DRILLING MACHINES

Purpose and field of application of drilling machines upright drill processes, radial drills, Alignment tests of drilling machine.

4. BORING MACHINE

Purpose and filed of application. Horizontal boring machines, Precision boring machines.

5. MILLING MACHINES

Purpose and types of milling machines, general purpose milling machines, different types of milling operations , milling cutters, attachments extending the processing capabilities of general purpose milling machines. Alignment tests of milling machine.

6. PLANERS, SHAPERS AND SLOTTERS

Classification : Attachments extending the processing capacities of each.
 Sawing and broaching, Machines: Metal sawing classification : reciprocating sawing machines, circular sawing machines, band sawing machines. Types of broaching machines, advantage and limitations of broaching.

7. GRINDING MACHINES AND ABRASIVES:

Classification of grinding machines, cylindrical grinders, internal grinders, Surface grinders, tool and cutter grinders, grinding wheel surface finishing. Abrasives, manufacture or grinding wheels.

B. TERM WORK

1. Plain, step and taper turning - One job.
2. Thread cutting, right and left hand threads - One job.
3. Thread cutting – multistory – One Job.
4. Machining Plane surface on a shaper and milling machine – One job.
5. Simple gear cutting job on milling machine- One job.

C. PRACTICAL/ ORAL

PRACTICAL /ORAL WILL BE BASED ON THE ABOVE TOPICS.

D. REFERENCE BOOKS:

1. Workshop Technology Vol. II by Haxra & Chodhri.
2. Manufacturing Processes by O.P. Khanna.
3. Workshop Technoglogy Vol. I &II & III by Chapman.
4. Production Technology by R.K.Jain.

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –III PRODUCTION ENGINEERING
P- 304 THEORY OF MACHINE

Teaching Scheme		Examination Scheme				
Theory Hrs.	Practical Hrs.	Marks	Theory Hrs.	Practical/Oral Marks	Term work Marks	Total Marks
04	02	100	03	25	25	150

A. THEORY

1. LINKS & MECHANISM

Links : Kinematics pairs, higher and lower pairs, constraints, slider chains, double slider crank, Chains, inversions. Exact straight line mechanism of peaucelliers, Heart and Scott. Roussell approximate straight line mechanisms of grasshopper, watt and Rogers. Pantograph, starting gear mechanisms condition for corrects tearing Davis and Ackerman starting gears.

2. MOTION

Rectilinear and rotational motion a plane, compound pendulum. Velocity and acceleration in machine parts, instaneous center, cent rode, its laws, velocity and acceleration acceleration diagrams for simple kinematics mechanisms. (Vector and graphical approach)

3. FRICTION

Inclined plane, condition for maximum efficiency, pivot & collar friction, uniform pressure & uniform wear, friction circle, friction axis. Belt & rope drive effect of centrifugal stress on power transmitted slip & creep effect, use off Jockey Pulleys.

4. BRAKES AND DYNAMOMETERS

Simple block brakes, Internal expanding shoe brake band , brake, braking of a vehicle transmission types of dynamometer.

5. CAMS

Types of Cams & follower displacement , Velocity and acceleration of followers, Construction of cam profiles with Knife – edge with roller and with flat footed for reciprocating and oscillating followers.

6. GEAR TRAINS

Simple, compound and reverted wheel train, epicyclical gearing , analysis of sun and planet system, examples of multi speed epicyclical gear boxes, bevel gears epicyclical trains, differential box.

B. TERM WORK : Term work will be based on above topic (at least 10 Precticals)

C. PRACTICAL/ORAL : IT WILL BE BASED ON THE ABOVE TOPICS.

D. REFERENCE BOOKS :

1. Theory of Machines by Ballany.
2. Theory of Machines by J.M. Shah & Jadwani.
3. Theory of Machines by Abdullah Sharif.
4. Theory of Machines by R.S. Khurmi.

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –III PRODUCTION ENGINEERING
MP- 305 FUNDAMENTALS OF MACHINE DESIGN &
INDUSTRIAL DRAFTING

Teaching Scheme		Evaluation Scheme				
Theory Hrs.	Practical Hrs.	Marks	Theory Hrs.	Practical/Oral Marks	Term work Marks	Total Marks
04	04	100	04	25	25	150

A. THEORY

PART - I MACHINE DESIGN

1. **Design consideration of Machine Parts**
 Loads, different types, factors of safety, selection of materials, stresses, factors affecting its selection, determination of factor of safety, tensile, compressive shear, bending bearing crushing stresses, bending and tensional shear stress, transverse shear, principle stress determination. Eccentric loading bearing pressure.
2. **Cotter and Knuckle Joints**
 Designs of simple cotter joints, cotter joints with a sleeve, cotter foundation bolt, Gib and cotter joints design of knuckle joints, Applications.
3. **Design of Riveted Joints**
 Types of joints design of double and triple riveted butt joints with equal and unequal cover plates. Design of lap joints.
4. **Welded and Riveted Joints under eccentric loading**
 Design of riveted connections subjected to eccentric loading, design of bolts under eccentric loading when (a) load is parallel to the bolt axis (b) perpendicular to bolt axis.
5. **Keys and Couplings**
 Design of sunk keys, design of a muff, clamp flange (Protected type) and bushed pin type of flexible flange couplings.
6. **Power Screws**
 Types of threads, design of screw with different types of threads used in practices. Design of nuts, Design of C clamp, Screw jack, design of toggle jack, design of coupler.
7. **Levers:** General Procedure of design of levers, design of a lever of a safety valve, design of bell crank lever, design of rocker arm for exhaust valves.
8. **Limits, Fits and Tolerances :** Tolerances, functional and non-functional dimensions, Unilateral & bilateral tolerances, Dimensional tolerances, different types of gauges, Interchangeability & selective assembly, testing & calibration of gauges, Hole base & shaft base systems, different types of fit as per ISI. Application of types of fits in M/c tools, geometrical tolerances & gauge design assembly.

PART B & C ARE TO BE DEALT IN LABORATORY

B. INDUSTRIAL DRAFTING :

1. Assembly drawing, standard drawing, machine shop drawing, pattern shop, sheet metal drawing.
2. Production drawing : Elements of production drawing, information on drawing, tolerances, manufacturing methods.
3. Surface roughness : Roughness and Machining symbols, indication on drawings.

C. AUTOCAD.

1. **Introduction to Computer Aided Drawing :** Objectives , Introduction to drawing using CAD , Advantages of using CAD, 2 & 3 dimensional modeling , application of CAD.
2. **Auto cad an overview :** Introduction , development systems requirements, drawing by AUTO CAD.
3. **Auto Cad Basics :** Introduction of Main menu, starting new drawing drawing editor, entering commands using mouse, pull down menus, screen menu getting help from AUTO CAD data entry, error correcting.
4. **Working with Auto Cad :** Setting limits , drawing lines, using zoom , erasing lines, drawing lines, saving the work.
5. **Editing adding dimensions and test:** Edit commands, trim, fillet, copy line type , rotate, move commands , dimensioning the drawing , text commands.
6. **Plotting the drawing** using dot matrix printer and plotter.

B. TERM WORK

MACHINE DESIGN

1. Design of Machine elements and preparation of report.
 - a. Design of screw, nut and other parts from topic no. 9 atleast one problem
 - b. Design of levers (one problem)
 - c. Design of Couplings (One problem)
 - d. Design of riveted joint (One problem)
 - e. Design Consideration (One pronlem)

INDUSTRIAL DRAFTING

2. Design and Assembly and detailed drawing of :
 - a. Cotter/ Knuckle joints / Connection rod (One Sheet)
 - b. Coupling / Power Screw (One Sheet)The design calculations be included in part A above. Atleast one drawing be production drawing . Drawing be on A2 size (both details and assembly)

AUTO CAD

Preparation of assembly and details drawings of machine components assembly using AUTO CAD.

C. PRACTICAL /ORAL

IT WILL BE BASED ON THE ABOVE TOPICS.

D. REFERENCE BOOKS

1. Elements of Machine Design by Pnadya and Shah.
2. Machine Design Vol. I & II Patel & Pandya.
3. Machine Design by R.B. Gupta.
4. Machine Design by R.K. Jain.
5. Machine Design by Sharma & Agrawal.
6. Mechanical Engg. Design by Dr. Sadhusingh.
7. Machine Design by A Sharif.
8. A text book on Production Drawing by Narayana Kanniah & Reddy.
9. Computer aided Drafting Auto Cad ISTE Nomogram.
10. Instant reference for Auto cad by George Omura BPB Pub. Co.
11. Inside Auto cad by Racker & Rice BPB Pub. Co.