[B16 ENG 2101]

II/IV B.Tech. DEGREE EXAMINATION

First Semester.

MATHEMATICS-IV

MODEL QUESTION PAPER

(Common to CIV, ECE, EEE & ME)

Time: 3 Hrs. **Max. Marks: 70**

Question No. 1 compulsory.
Answer any FOUR questions from the remaining.
All Questions Carry equal marks
All parts of a question must be answered at one place only

1 (a) Find a unit vector normal to the surface $x^3 + y^3 + 3xyz = 3$ at the point $(1, 2, -1)$.

(b) Show that $Curl(grad\,\phi) = 0$.

(c) Show that $\iint_S \nabla r^2 \cdot d\bar{s} = 6V$.

(d) State two-dimensional Laplace equation in Cartesian coordinates. Define harmonic function.

(e) Find the analytic function whose real part is $x^3 - 3xy^2$.

(f) Evaluate $\oint_C \frac{z^2 - z + 1}{(z-2)} dz$ where C is the circle $|z| = 1$.

(g) Find the nature and location of the singularities of the function $\frac{1}{(z-1)^3}$.

2 (a) Find the directional derivative of $f = x^2 - y^2 + 2z^2$ at the point $P(1,2,3)$ in the direction of the line PQ where Q is the point $(5,0,4)$. Also calculate the magnitude of the maximum directional derivative.

(b) Prove that $\nabla^2 f(r) = f''(r) + \frac{2}{r} f'(r)$.

3(a) Show that $\bar{F} = (2xy + z^3)\bar{i} + x^2\bar{j} + 3xz^2\bar{k}$ is a conservative field. Find the potential function and hence the work done in moving a particle in this field from $(1,-2,1)$ to $(3,1,4)$.

(b) Use Green's theorem to evaluate $\oint_C [(3x - 8y^2)dx + (4y - 6xy)dy]$ where C is the boundary of the region described by $x = 0, y = 0 \; and \; x + y = 1$

4 (a) Evaluate $\iiint_v div\ \bar{F}\, dv$ where $\bar{F} = y\bar{i} + x\bar{j} + z^2\bar{k}$ over the cylindrical region bounded by $x^2 + y^2 = 9$, $z = 0$ and $z = 2$.

(b) Find components of the vector field $z\bar{i} - z\bar{j} + y\bar{k}$ in cylindrical polar coordinates.

5 (a) Solve the equation $p\,y^3 + q\,x^2 = 0$ by the method of separation of variables.

(b) A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially at rest in its equilibrium position. If it is set vibrating by giving to each of its points a velocity $\lambda x(l - x)$, find the displacement of the string at any distance x from one end at any time t.

6 (a) If $f(z)$ is a regular function of z, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |f(z)|^2 = 4|f'(z)|^2$.

(b) Find the bi-linear transformation which maps the points $z = 1, -1, \infty$ of the z-plane onto the points $w = 1+i, 1-i, 1$ of the w-plane. Hence find the critical points and the invariant points of this transformation.

7(a) Evaluate $\oint_C \frac{z^3 + z + 1}{z^2 - 7z + 2} dz$, where C is the ellipse $4x^2 + 9y^2 = 1$.

(b) Find the Laurent's expansion of the function $f(z) = \frac{1}{(1-z)(2-z)}$ valid for

(i) $0 < |z-2| < 1$ (ii) $|z-1| > 1$.

8 (a) Evaluate $\int_c \tan z \, dz$ where C is the circle $|z| = 2$.

(b) Use calculus of residues to evaluate $\int_0^{2\pi} \frac{Cos\,3\theta}{5 - 4\,Cos\,\theta} d\theta$.

[B16 ME 2101]
II/IV B.Tech. I Semester Degree Examinations
MECHANICS OF SOLIDS
MODEL QUESTION PAPER
Mechanical Engineering

Time: 3 Hours Max. Marks:70

Question No.1 compulsory
Answer any FOUR questions from the remaining
All questions carry equal marks
All parts of a question must be answered at one place only

1. Answer the following questions
   (a) Define Poisson's ratio and young's modulus. [2 M]
   (b) Define principal planes and principal stresses. [2 M]
   (c) What are the assumptions made in the theory of simple bending? [2 M]
   (d) Define bending moment and shear stress. [2 M]
   (e) Sketch the distribution of shear stresses across the depth of the beam of T-section. [2 M]
   (f) Define torsion and polar moment of inertia. [2 M]
   (g) Name and sketch the different types of loads acting on beams. [2 M]

2. (a) Define and derive the relation between elastic constants. [7 M]
   (b) An axial pull of 35,000 N is acting on a bar consisting of three lengths 20 cm; 25 cm and 22 cm with diameters of 2 cm; 3 cm and 5 cm respectively, If the young's modulus is 2.1×10^5 N/mm^2. Determine stress in each section and total extension of the bar. [7 M]

3 (a) A rectangular bar is subjected to two direct stresses (σ_x and σ_y) in two mutually perpendicular directions. Derive the expression for normal stress and shear stress on an oblique plane which is inclined at an angle with the axis of minor stress. [7 M]
   (b) At a point in a strained material, the principal stresses are 200 N/mm^2 (T) and 60 N/mm^2 (C). Determine the direction and magnitude in a plane inclined at 60^o to the axis of major principal stress. What is the maximum intensity of shear stress in the material at the point? [7 M]

4. (a) Explain different types of beams, supports and loads, carried by beams with neat sketches. [7 M]
   (b) A cantilever of 10m length carries point loads of 20, 30 & 100 KN at 3, 6 & 9m from fixed end respectively. Draw SFD & BMD. [7 M]

5. (a) Prove that the maximum shear stress in a circular section of a beam is 4/3 times the average shear stress. [7 M]
   (b) A rectangular beam of 200mm deep and 300 mm wide is simply supported over a span of 8m. What uniformly distributed load per meter the beam may [7 M]

carry, if the bending stress is not exceeding 120 N/mm^2.

6. (a) A solid shaft of diameter 80mm is subjected to a twisting moment of 8 MN-mm and a bending moment of 5 MN-mm at a point. Determine (i) principal stress and (ii) Position of the plane on which they act. [7 M]

   (b) A hallow shaft of external diameter 120 mm transmits 300 KW power at 200 rpm. Determine the maximum internal diameter if the maximum stress in the shaft is not to exceed 60 N/mm^2. [7 M]

7. (a) Derive an expression for circumferential stress and longitudinal stress for a thin shell subjected to an internal pressure. [7 M]

   (b) A thin spherical shell of diameter 3 m and of thickness 6 cm contains a gas, if the tensile stress in the material is not to exceed by 70 N/mm^2, determine the internal pressure of the gas. [7 M]

8 A beam of constant cross-section 6 meters long is freely supported at its ends. It is loaded at points 2m from each end with load of 20000N. Find the ratio of the deflection under the center of the beam to the deflection at a point under one of the loads. [14 M]

[B16 ME 2101]

[B16 ME 2102]

II/IV B.Tech. I Semester Degree Examinations

THERMODYNAMICS

MODEL QUESTION PAPER

Mechanical Engineering

Time: 3 Hours Max. Marks:70

Question No.1 compulsory
Answer any FOUR questions from the remaining
All questions carry equal marks
All parts of a question must be answered at one place only

1. Answer the following questions
   (a) Define Quasi-static process with neat sketch. [2 M]
   (b) What is a free expansion process? [2 M]
   (c) State the limitations of first law of thermodynamics. [2 M]
   (d) What is principle of increase in entropy? [2 M]
   (e) Define Compression ratio and its importance in Diesel cycle. [2 M]
   (f) Define Available energy. [2 M]
   (g) State the law of partial pressures. [2 M]

2. (a) Explain the concept of continuum in detail. [7 M]
   (b) Define energy and its types with an example. Also distinguish them by means of point and path functions. [7 M]

3 (a) Derive a relation between P-V-T for an adiabatic non-flow process. [7 M]
   (b) Prove that the formula $T^b V^{a-b} e^{KT}$=Constant for the adiabatic expansion of a gas if C_P=a+KT and C_V =b+KT where a, b, and k are constants and T in Kelvin. Calculate the workdone if 2 kg of gas originally occupying 0.2 m^3 at 40 bar expands adiabatically until the temperature is 260^0C, given that a=0.948,b=0.656 and K=0.0001. [7 M]

4. (a) Derive steady flow energy equation and also derive an equation for exit velocity of nozzle. [7 M]
   (b) An axial flow compressor of a gas turbine plant receives air from atmosphere at a pressure 1 bar, temperature 300K and velocity 60 m/s. At the discharge of compressor the pressure is 5 bar and velocity is 100 m/s. The mass flow rate through the compressor is 20 kg/s. Assuming isentropic compression, calculate the power required to drive the compressor. Also calculate the inlet and outlet pipe diameters. Take density at inlet and outlet as 100 kg/m3 and 500 kg / m3 respectively. [7 M]

5. (a) What are the various Causes of Irreversibility? Explain in detail any two causes. [7 M]
   (b) A reversible heat engine operates between two reservoirs at a temperature of 700^0C & 50^0C.The engine drives a reversible refrigerator which operates [7 M]

between reservoirs at temperatures of 50^0C and -25^0C. The heat transfer to the engine is 2500 KJ and the network output of the combined engine refrigerator plant is 400 KJ. Determine the heat transfer from the refrigerator and the net heat transfer to the reservoir at 50^0C.

6. (a) Derive the air standard efficiency of Otto cycle with neat sketch. [7 M]
(b) The compresion ratio and expansion ratio of an oil engine working on the dual cycle are 9 and 5 respectively. The initial pressure and temperature of the air are 1 bar and 30^0c. The heat liberated at constant pressure is twice the heat liberated at constant volume. The expansion and compression follow the law $pv^{1.25}$= constant. Determine pressure and temperature at all points, mean effective pressure,efficiency and power of the engine if working cycles per second are 8. Take bore diameter (D)=250mm, stroke length (L)= 400mm. [7 M]

7. (a) Derive availability functions for closed and open systems. [7 M]
(b) Derive any two Maxwell's relations [7 M]

8 (a) Derive specific heats of gas mixtures. [7 M]
(b) A mixture of ideal gases consists of 4kg of N_2 and 6kg of CO_2 at a pressure of 4bar and a temperature of 20^0 C. Find (i) the mole fraction of each constituent; (ii) the equivalent molecular weight of the mixture; (iii) the equivalent gas constant of the mixture; (iv) the partial pressures (v) the volume and density of the mixture; (vi) the Cp and Cv of the mixture. Take γ for CO_2 as 1.286 and for N_2 as 1.4. [7 M]

[B16 ME 2102]

[B16 ME 2103]

II/IV B.Tech. I Semester Degree Examinations

MANUFACTURING PROCESS

MODEL QUESTION PAPER

Mechanical Engineering

Time: 3 Hours Max. Marks:70

Question No.1 compulsory
Answer any FOUR questions from the remaining
All questions carry equal marks
All parts of a question must be answered at one place only

1. Answer the following questions
   (a) What are different ingredients of moulding sand? [2 M]
   (b) Write a short note on wire drawing. [2 M]
   (c) List any four pattern materials. [2 M]
   (d) What are electrode materials for resistance welding? [2 M]
   (e) Explain about 2-high rolling mill [2 M]
   (f) Define brazing and soldering. [2 M]
   (g) Classify forging process. [2 M]

2. (a) List out various pattern allowance. Discuss any four [7 M]
   (b) Enumerate with neat sketches about various steps involved in making investment casting. [7 M]

3 (a) Explain various properties of moulding sand. [7 M]
   (b) Explain various steps involved in shell moulding process with sketches. [7 M]

4. (a) Describe the principle of rolling. Write the various kinds of rolling mills along with their applications. [7 M]
   (b) What is extrusion? Explain the process with the help of a neat sketch. [7 M]

5. (a) What is forging? Explain various forging processes with the help of neat sketches. [7 M]
   (b) With the help of neat sketch explain the working of (i) embossing; (ii) coining; (iii) stretch forming. [7 M]

6. (a) Define resistance welding and briefly discuss the variables influence the same. [7 M]
   (b) How natural, oxidizing and reducing flames are obtained in welding torch? Draw their sketches. [7 M]

7. (a) Explain in detail about gas metal arc welding process with neat sketch. [7 M]
   (b) Explain the terms (i) friction welding; (ii) explosive welding; (iii) diffusion welding. [7 M]

8 (a) Write a short note on any three of the following (i) Hot & Cold working; (ii) Pattern allowances; (iii) any four casting defect; (iv) hot spinning. [14 M]

[B16 ME 2104]

II/IV B.Tech. I Semester Degree Examinations

ENGINEERING MECHANICS

MODEL QUESTION PAPER

Mechanical Engineering

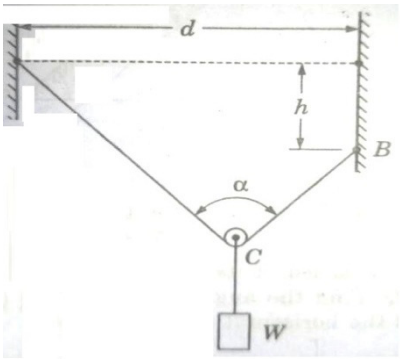
Time: 3 Hours Max. Marks:70

Question No.1 compulsory
Answer any FOUR questions from the remaining
All questions carry equal marks
All parts of a question must be answered at one place only

1. Answer the following questions
   (a) Write the Threoms of Pappus. [2 M]
   (b) Define Time of Flight, Range and Maximum Height of a projectile. [2 M]
   (c) Define plane truss. [2 M]
   (d) Explain the terms kinematics and kinetics. [2 M]
   (e) Write the laws of friction. [2 M]
   (f) State Law of parallelogram Law of Forces. [2 M]
   (g) What is freebody Diagram? [2 M]

2. (a) State and prove Varignon's theorem. [7 M]
   (b) Describe the procedure to find the resultant in concurrent force system, parallel force system and general force system. [7 M]

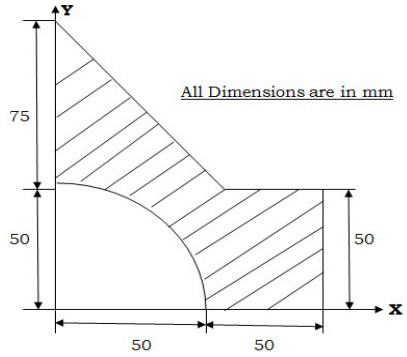
3 (a) A string ABC of length *l* carries a small pulley C from which a Load W is suspended. The string hangs between two vertical walls which are at a distance *d* apart. The end A is higher than the end B by height *h*. Find the position of equilibrium defined by the angle α. Assume *d*= *l*/2 and *h*=*l*/4. [7 M]



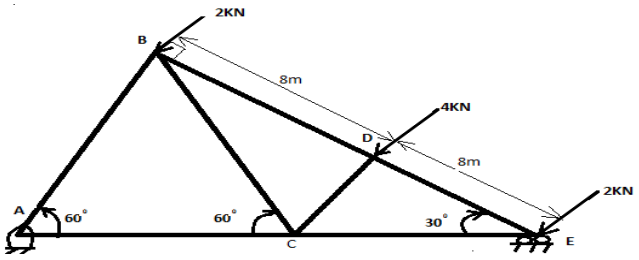
   (b) Derive the moment of inertia of Triangle about its centroidal axis and determine the moment of inertia about its base. [7 M]

4. (a) Find the centroid of the area bounded between the line y = x and by the curve $y = ax^2$ in the first quadrant. [7 M]

   (b) Determine the M.I of the shaded area about centroidal x and y axis. [7 M]

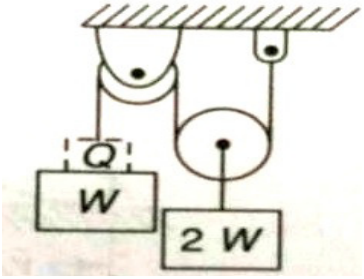


5. (a) Write the assumptions made for a perfect Truss. [4M]
(b) Determine the Forces in all the members if the Plane Truss shown below and Verify the forces in the members BD,CD and CE by method of Sections. [10 M]



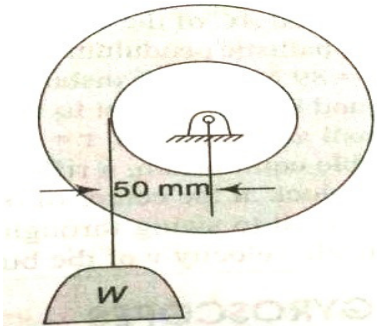
6. (a) Why coefficient of static friction is greater than the coefficient of kinetic friction? [4 M]
(b) A uniform ladder AB of length l =20m and weight W is supported by the horizontal floor at A and by a vertical wall at B. It makes an angle 45^o with the horizontal. If a man, whose weight is one half that of the ladder ascends the ladder, how much length x of the ladder he shall climb before the ladder slips. If a boy now stands on the end A of the ladder, what must be his least weight w so that the man may go to the top of the ladder? Assume μ between Ladder and wall is 1/3; μ between Ladder and Floor is 1/2. [10 M]

7. (a) A stone is dropped into a well and falls vertically with constant acceleration due to gravity. The sound of impact of the stone on the bottom of the well is heard 6.5s after it is dropped. If the velocity of the sound is 336m/s, how deep is the well? [7 M]
(b) Weight W and 2W are supported in a vertical plane by a string and pulleys arranged as shown in Fig. Find the magnitude of an additional weight Q applied on the left which will give a downward acceleration a = 0.1g to the weight W. [7 M]



8 (a) Derive the general equation of projectile motion. [7 M]

(b) A rotor of weight W = 1720 N and radius of gyration k0 = 100 mm is mounted on a horizontal shaft and set in rotation by a falling weight W = 1720 N as shown in Fig. If the system is released from rest, find the velocity of the block after it has fallen through a distance of 3 m. [7 M]



[B16 ME 2104]

[B16 ME 2105]

II/IV B.Tech. I Semester Degree Examinations

MECHANICAL ENGINEERING DRAWING

MODEL QUESTION PAPER

Mechanical Engineering

Time: 3 Hours Max. Marks:70

Answer all questions

Assume any missing data wherever it is necessary

1. Sketch any THREE of the following with proportionate dimensions [15 M]
   (a) Profiles of ACME and BUTTRESS thread for 40mm pitch. [5 M]
   (b) Double riveted zigzag lap joint which is having 20 mm diameter rivet. [5 M]
   (c) Three views of 20 mm Hexagonal headed bolt with Nut. [5 M]
   (d) Sectional front view of 20mm diameter Eye foundation bolt. [5 M]
   (e) Two views of a hollow saddle key and gib headed key fitted in position on a 40 mm diameter shaft. [5 M]

2. (a) Two rods 20mm diameter each are to be fastened together to enable them to transmit tensile forces. Suggest the type of Joint and draw its full sectional front view and its simple top view or its simple side view. [10 M]

   [OR]

   (b) Two rods of 20 mm diameter each are to be coupled together to enable them to transmit power from one shaft to another shaft such that the axis of two shafts lie in the same line. Suggest the type of coupling to be used to transmit power and draw its half sectional front view and its simple side view. [10 M]

3. Draw the Front View and Sectional Left side view of the component shown in Figure 1 [20 M]

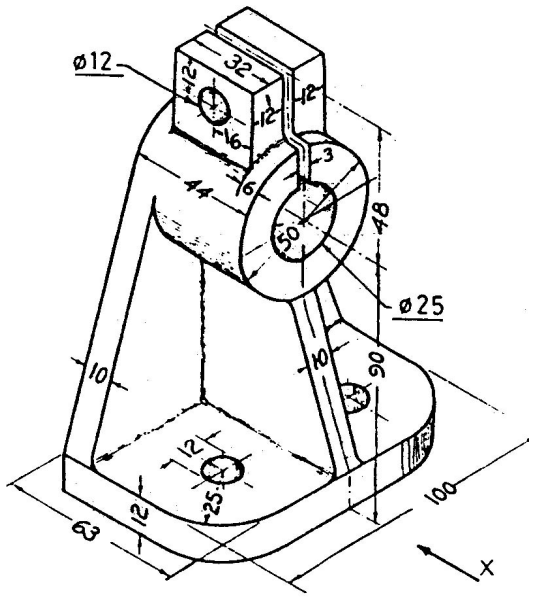


Figure 1

4. Draw the following views for the simple eccentric assembly shown in Figure 2. [25 M]
(i) Half sectional front view; (ii) simple side view

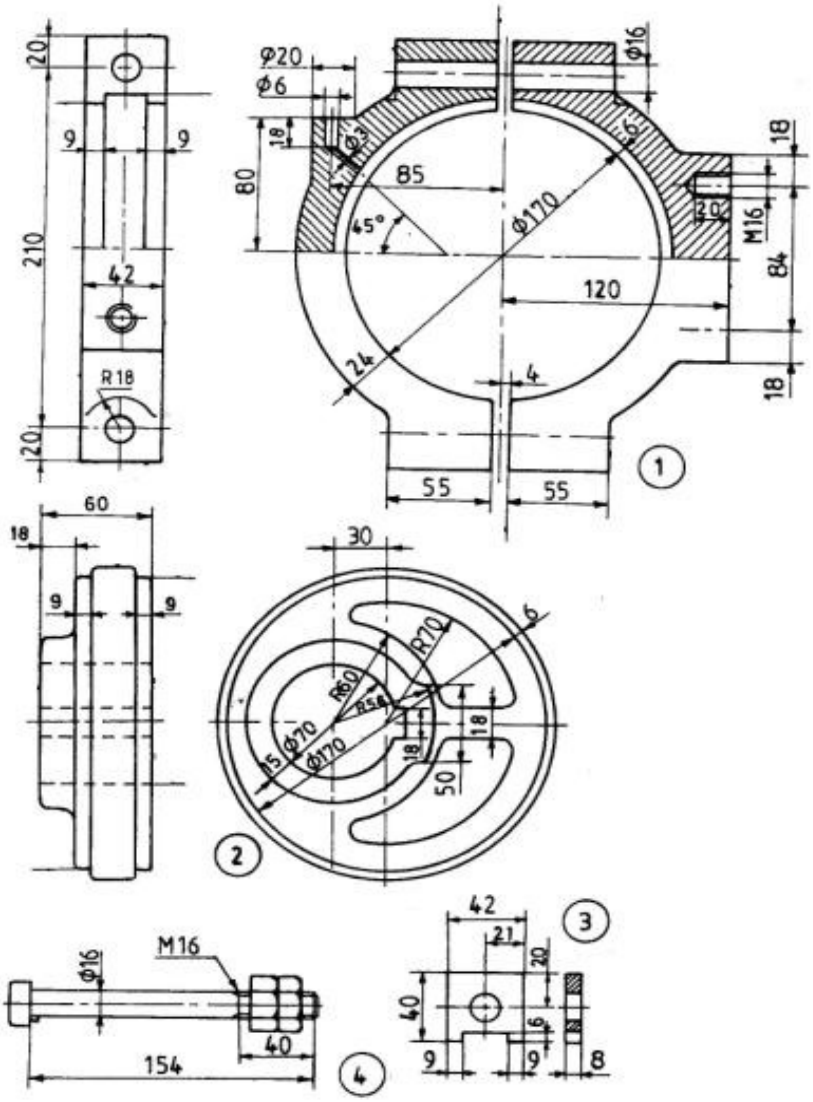


Figure 2. Parts of Simple Eccentric

Parts List

Part No.	Name	Material	Qty.
1.	Straps	Cast Iron	2
2.	Sheave	Cast Iron	1
3.	Shim	Brass	1
4.	Bolt & Nuts	Mild Steel	2

[B16 ME 2105]

[B16 ME 2201]

II/IV B.Tech. II Semester Degree Examinations

ADVANCED STRENGTH OF MATERIALS

MODEL QUESTION PAPER

Mechanical Engineering

Time: 3 Hours Max. Marks:70

Question No.1 compulsory
Answer any FOUR questions from the remaining
All questions carry equal marks
All parts of a question must be answered at one place only

1. Answer the following questions
   (a) What are the different methods used to find out the slope and deflection at a section in a loaded Beam? [2 M]
   (b) What do you mean by fixed beam? [2 M]
   (c) Write the general three moment equation and explain the terms used in equation. [2 M]
   (d) What are the assumptions made in the Euler's theory? [2 M]
   (e) Define strut and column. [2 M]
   (f) When the crane hook lifts a load heavier in weight where the maximum stress is induced in the section? What is its nature? [2 M]
   (g) What is the disc of uniform strength? [2 M]

2. A fixed beam of span 6 meters carries two point loads, 150 KN and 240 KN at distances 2m and 4m from the left end. Find the end moments. Find also the maximum sagging moments. Draw S.F. and B.M. diagrams. [14M]

3 A continuous beam ABC consists of two spans AB and BC of lengths 6 m and 8 m. The span AB carries a point load of 120 KN at 4m from A, while the span BC carries a point load of 160 KN at 5 m from C. Find the moments and reactions at the supports. [14M]

4. (a) Derive the expressions fir the Crippling load for a long column when both ends are fixed. [7 M]
   (b) A hollow cylinder cast iron column is 4m long, both ends being fixed. Design the column to carry an axial load of 250 KN. Use Rankine's formula and adopt a factor of safety of 5. The internal diameter may be taken as 0.80 times the external diameter. Take F_e = 550 N/mm² and α = 1/1600. [7 M]

5. (a) Explain effect of sinking in Fixed Beams. [7 M]
   (b) A metal column of external diameter 300 mm and thickness 20 mm carries a load of 400kn at an eccentricity of 50mm .determine the maximum and minimum stresses in the column if its length is 5cm and both the ends of the column are fixed. Take E= 95GPa [7 M]

6. (a) Derive an expression for circumferential stress and hoop stress for a thick [7 M]

cylinder subjected to an internal and external pressure.

(b) The internal and external diameters of thick cylinders are 80 mm and 120 mm respectively, if it is subjected to an internal pressure of 120 MN/m^2 and external pressure of 40 MN/m^2. Calculate the circumferential stress at the external and internal surfaces. [7 M]

7. A curved beam of rectangular cross-section of width 20 mm and depth 40 mm is subjected to pure bending moment of +600N-m. The mean radius of curvature is 50 mm. Plot the variation of stresses across the section. [14M]

8 (a) Derive the expression for the thickness of disc of uniform strength in terms of radius r. [7 M]

(b) A disc uniform thickness having inner and outer diameters 100 mm and 400 mm respectively is rotating at 5000 rpm about its axis. The density of the material of the disc is 7800 Kg/m^3 and poisons ratio is 0.28. Determine the stress variations along the radius of the disc. [7 M]

[B16 ME 2201]

[B16 ME 2202]

II/IV B.Tech. II Semester Degree Examinations

THERMAL ENGINEERING

MODEL QUESTION PAPER

Mechanical Engineering

Time: 3 Hours Max. Marks:70

Question No.1 compulsory
Answer any FOUR questions from the remaining
All questions carry equal marks
All parts of a question must be answered at one place only

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1. Answer the following questions
   (a) Define Heat of superheat in steam using T-H diagram. [2 M]
   (b) State various components of a simple vapour power cycle. [2 M]
   (c) What are various types of nozzles? [2 M]
   (d) What is compounding and state various types of compounding [2 M]
   (e) State various pressures based on absolute zero pressure. [2 M]
   (f) Necessity of steam boiler in a steam power plant. [2 M]
   (g) Effects of air leakage in a condenser. [2 M]

2. (a) Describe about a separating throttling calorimeter with neat sketch. [7 M]
   (b) Determine the amount of heat which should be supplied to 2kg of water at 25^0 C to convert in to steam at 5bar and 0.9 dry. [7 M]

3 (a) Explain Reheat vapour power cycle in detail with neat sketch. [7 M]
   (b) In a single heater regenerative cycle the steam enters the turbine at 30bar and 400^0 C and the exhaust pressure is 0.1bar. The feed water heater is direct contact type which operates at 5bar. Find (i) the efficiency and the steam rate of the cycle; (ii) the increase in mean temperature of heat addition, efficiency and steam rate as compared to the basic rankine cycle (without regeneration); pump work may be neglected. [7 M]

4. (a) Explain supersaturated flow in detail with the help of neat sketch. [7 M]
   (b) A convergent-divergent nozzle is to be designed in which steam initially at 14 bar and 80^0 C of superheat is to be expanded down to a back pressure of 1.05 bar. Determine the necessary throat and exit diameter of the nozzle for a steam discharge of 500 kg/hour, assuming that the expansion is in thermal equilibrium throughout and friction reheat amounting to 12% of the total isentropic enthalpy drop to be effective in the divergent part of the nozzle. [7 M]

5. (a) State various differences between impulse and reaction turbines. [7 M]
   (b) The following particulars relate to a two row velocity compounded impulse wheel. Steam velocity at nozzle outlet is 650 m/s. Mean blade velocity is 125 m/s. Nozzle outlet angle is 16^0. Outlet angles of 1^{st} moving blade, fixed guide blade and 2^{nd} row of moving blades are 18^0, 22^0 & 36^0 respectively. Steam flow [7 M]

is 2.5kg/sec. The ratio of the relative velocity at outlet to that at inlet is 0.84 for all blades. Determine axial thrust on the blades, power developed and efficiency of the wheel.

6. (a) Explain with neat sketch any one surface condenser. [7 M]

(b) During a trail on a steam condenser, the following observations were recorded: Condenser vaccum - 680 mm of Hg, Barometer reading-764mmof Hg, Mean condenser temperature- 36.2^{o} c, Hot well temperature-30^{o}c, Condensate formed per hour- 1780Kg, Circulating cooling water inlet temperature - 20^{o}c, Circulating cooling water outlet temperature 32^{o}c, Quantity of cooling water - 1250Kg/min. Determine: [7 M]

(1) Condenser vaccum corrected to standard barometer
(2) Vaccum efficiency.
(3) Condenser efficiency.
(4) Condition of steam entering the condenser.
(5) Mass of air present per kg of condensed steam.

7. (a) Explain Babcock & Wilcox boiler with neat sketch. [7 M]

(b) Explain in detail with neat sketch any one accessories and mounting. [7 M]

8 (a) Explain pressure-velocity compounding in steam turbines [7 M]

(b) Sketch the isobaric, throttling, isentropic and isothermal processes individually on Mollier chart. [7 M]

[B16 ME 2203]

II/IV B.Tech. II Semester Degree Examinations

METAL CUTTING & MACHINE TOOLS

Mechanical Engineering

Time: 3 Hours Max. Marks:70

Question No.1 compulsory
Answer any FOUR questions from the remaining
All questions carry equal marks
All parts of a question must be answered at one place only

1. Answer the following questions
   (a) What are the methods of indexing? [2 M]
   (b) Enumerate the methods of taper turning in lathe. [2 M]
   (c) What are the four important characteristics of materials used for cutting tools? [2 M]
   (d) What are the operations which can be performed using planer? [2 M]
   (e) What is built up edge? [2 M]
   (f) Differentiate drilling from boring. [2 M]
   (g) State the advantages of broaching. [2 M]

2. (a) Explain the different types of chip formation and their effects on machining. [7 M]
   (b) A steel tube 40 mm outside diameter is turned on a lathe. The following data was obtained: Rake angle = 220; Cutting speed = 18m/min; Feed = 0.2 mm/rev; Cutting force = 180 kgf × 9.81 N; Feed force = 60 kgf × 9.81 N; Length of continuous chip in one direction = 50 mm. [7 M]
   Determine: (i) Chip thickness ratio; (ii) chip thickness; (iii) Shear plane angle; (iv) velocity of chip along tool face; (v) coefficient of friction.

3 (a) Draw the neat sketch of single point cutting tool and show the different parts and angles on it. [7 M]
   (b) While machining a mild steel bar with HSS tool the cutting speed is 32 m/min, tool life is 50 min, if cutting speed is increase by 50%, how tool is affected? Take n = 0.2. [7 M]

4. (a) Explain any one mechanism of a shaper. [7 M]
   (b) Explain how thread cutting is performed on lathe with a neat sketch. [7 M]

5. (a) Explain the construction and working principal of a radial drilling machine. [7 M]
   (b) What is broaching. Explain the nomenclature of Pull broach. [7 M]

6. (a) Describe the working of column and knee type milling machine. [7 M]
   (b) Explain the indexing mechanism with a neat diagram. [7 M]

7. (a) Explain the principle of operation of AJM. What are its applications? [7 M]

(b) What is EDM? Explain. [7 M]

8 (a) Describe the galzing, loading and dressing of grinding wheels. [14 M]
(b) Describe the working of cylindrical grinding machine.

[B16 ME 2203]

[B16 ENG 2202]

II/IV B.Tech. II Semester Degree Examinations

ENGINEERING ECONOMICS

MODEL QUESTION PAPER

Mechanical Engineering

Time: 3 Hours Max. Marks:70

Question No.1 compulsory
Answer any FOUR questions from the remaining
All questions carry equal marks
All parts of a question must be answered at one place only

1. Write short notes on the following
   (a) Economics [2 M]
   (b) Factors of production [2 M]
   (c) Oligopoly [2 M]
   (d) Inflation [2 M]
   (e) Job costing [2 M]
   (f) Types of public enterprises [2 M]
   (g) Depreciation [2 M]

2. State that law of demand. Why does the demand curve slope downwards? Are there any exceptions to it? [14 M]

3 What do you mean by mixed economy? Discuss the main features, merits and demerits of it. [14 M]

4. Describe the features of perfect competition. Illustrate the determination of price under perfect competition. [14 M]

5. What is a Business cycle? Describe the different phases of Business cycle. [14 M]

6. Illustrate Break-even analysis with the help of a diagram. What are its uses? [14 M]

7. What are the features of joint stock company? State its advantages and disadvantages? [14 M]

8 From the following Trial Balance, prepare Trading, P & L account and Balance sheet. [14 M]

Trial Balance

	Rs.		Rs.
Debtors	16,300	Capital	40,000
Cash	12,500	Sales	9,000
Furniture	10,000	Purchase returns	500
Purchases	3,500	Creditors	2,500
Sales returns	300		
Opening stock	2,000		

Rent and rates	750	
Insurance	350	
Wages	800	
Carriage	500	
Discount	650	
Oil and Fuel	550	
Drawings	2,900	
Carriage outwards	300	
Stationary	600	
	---	---
Total	52,000	52,000
	---	---

Closing stock value Rs.2,600.

[B16 ENG 2202]

[B16 EE 2204]

II/IV B.Tech. II Semester Degree Examinations

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

MODEL QUESTION PAPER

Mechanical Engineering

Time: 3 Hours Max. Marks:70

Question No.1 compulsory
Answer any FOUR questions from the remaining
All questions carry equal marks
All parts of a question must be answered at one place only

1.

(a) Define Ohm's Law and List out its Limitations [2 M]

(b) List the applications of DC Motors [2 M]

(c) Define regulation and efficiency of a transformer. [2 M]

(d) Define slip? What is the relationship between slip and speed of the induction motor? [2 M]

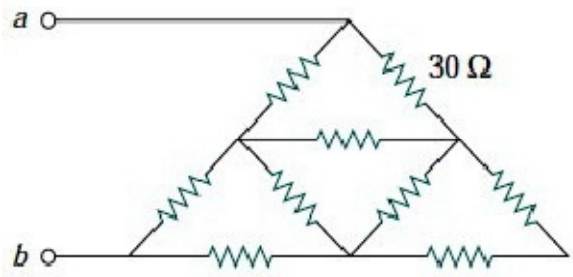
(e) List the differences between squirrel-cage and wound-rotor types of induction motor. [2 M]

(f) Why rating of the transformer is given in KVA? Explain. [2 M]

(g) Draw the circuit diagram symbols for p-n-p and n-p-n transistors. [2 M]

2. (a) State and explain Kirchhoff's Laws with example. [7 M]

(b) Find the equivalent resistance R_{ab} for the circuit shown below. All the resistor values are 30Ω. [7 M]



3 (a) Derive the torque equation of the DC motor. [7 M]

(b) An 8-pole, wave-connected armature has 600 conductors and is driven at 625 rev/min. If the flux per pole is 20 mWb, determine the generated E.M.F. [7 M]

4. (a) Derive the EMF equation of a single phase transformer [7 M]

(b) A 200 KVA rated transformer has a full-load copper loss of 1.5 kW and an iron loss of 1 kW. Determine the transformer efficiency at full load & half load for 0.85 power factor. [7 M]

5. (a) Draw and explain the slip-Torque Characteristics of Three phase Induction motor. [7 M]

(b) The frequency of the supply to the stator of a 6-pole induction motor is 50 [7 M]

Hz and the rotor frequency is 2 Hz. Determine (i) the slip, and (ii) the rotor speed in rev/min.

6. (a) Explain the procedure for finding Regulation of alternator by synchronous Impedance method. [7 M]
   (b) Explain the operation of Diode in Forward and reverse bias conditions and draw V-I characteristics. [7 M]

7. (a) Draw the circuit diagram of Bridge rectifier and explain its operation. [7 M]
   (b) Explain the operation of ZENER diode with neat Sketches. [7 M]

8 (a) Draw the circuit and explain the characteristics of Transistor in CE configuration. [7 M]
   (b) Explain how the transistor acts as an amplifier. [7 M]

[B16 EE 2204]

[B16 ENG 2201]

II/IV B.Tech. DEGREE EXAMINATION

Second Semester.

ENIVRONMENTAL STUDIES

MODEL QUESTION PAPER

(Common to ECE,EEE& ME)

Time: 3 Hrs. **Max. Marks: 70**

Question No. 1 compulsory.
Answer any FOUR questions from the remaining.
All Questions Carry equal marks

All parts of a question must be answered at one place only.

.1. Write short answers for the following:

(a) Give the objectives of Environmental Studies
(b) Define ecosystem
(c) What are hotspots?
(d) What is soil erosion?
(e) What is sustainable development?
(f) State the practical benefits of watershed management
(g) What is biomagnifications movement?

2. Write about structure and function of forest ecosystem

3. Give an account of the various energy resources of India and their merits and demerits.

4. Give the bio-geographical classification of India and add a brief note on threats to

biodiversity

5. Explain causes, effects and control measures of water pollution

6. Write a critical account of the effect of population growth on environment.

7. Give an account of rain water harvesting and watershed management with suitable

example

8. Write short notes:

a) Conflicts of water
b) Effect of modern agriculture
c) Noise pollution
d) Solid waste management

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