ME 4th/ Lib.

Roll No. ..... Total Pages : 2

44115

BT-4/J-25

PRODUCTION TECHNOLOGY–I

Paper : ME-202N

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks. Assume any missing data suitably.

UNIT–I

1. (i) Describe the tool geometry in ASA system. (8)

(ii) Explain the effect of rake angle and clearance angle. (7)

2. Explain mechanism of chip formation with neat sketches. Explain various types of chips with neat sketches. (15)

UNIT–II

3. (i) How is Tool life affected by variations in the feed rate and depth of cut? Explain. (7)

(ii) During the turning operation on a Lathe, the following data were recorded :

Tool life	: 90 minutes
Cutting Speed	: 30 m/min
Feed rate	: 0.25 mm/rev
Depth of cut	: 2.5 mm

If the cutting speed, feed and depth of cut are all increased by 30% individually as well as collectively, what will be the effect on the Tool life? The given Tool life equation for the tool is :

$$VT^{0.125} f^{0.7} d^{2.5} = C \quad (8)$$

4. Explain, how will you compute the different 'cost components' and the 'total roduction cost' of a machined workpiece. (15)

UNIT–III

5. (i) Differentiate between up-milling and down-milling. (8)

   (ii) Describe the elements of a plain milling cutter. (7)

6. What is a twist drill? Make a neat sketch of a twist drill and show its different parts on it. (15)

UNIT–IV

7. Give the specifications of lathe and milling machines. (15)

8. (i) What is a sine bar? Sketch a sine bar set-up on gauge blocks to check the angle on the end of a machine part. (8)

   (ii) Explain the factors affecting surface finish. (7)

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44117

BT-4/J-25

MECHANICS OF SOLIDS–II

Paper : ME-206N

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting *one* question from each unit. All questions carry equal marks. Assume any missing data.

UNIT–I

1. A load of 200 N falls through a height of 2.5 cm on to a collar rigidly attached to the lower end of a vertical bar 2 m long and of 3 cm^2 cross-sectional area. The upper end of the vertical bar is fixed. Determine : (i) maximum instantaneous stress induced in the vertical bar, (ii) maximum instantaneous elongation, and (iii) strain energy stored in the vertical rod. Take $E = 2 \times 10^5$ N/mm^2. 15

2. The load on a bolt consists of an axial pull of 10 kN together with a transverse shear force of 5 kN. Find the diameter of bolt required according to (1) Maximum principal stress theory; (2) Maximum shear stress theory;

(3) Maximum principal Strain theory; (4) Maximum strain energy theory; and (5) Maximum distortion energy theory. Take permissible tensile stress at elastic limit = 100 MPa and poisson's ratio = 0.3. 15

UNIT–II

3. A copper cylinder, 1 m long, 50 cm external diameter and wall thickness 5 mm has its both ends closed by rigid blank flanges. It is initially full of oil at atmospheric pressure. Calculate the additional volume of oil which must be pumped into it in order to raise the oil pressure to 4 N/mm^2 above atmospheric pressure. For copper assume, $E = 1.0 \times 10^5$ N/mm^2 and Poisson's ratio = 0.3. Take bulk modulus of oil as 2.5×10^3 N/mm^2. 15

4. A steel tube of 240 mm external diameter is to be shrunk on another steel tube of 80 mm internal diameter. After shrinking, the diameter at the junction is 160 mm. Before shrinking on, the difference of diameters at the junction was 0.08 mm. Calculate the radial pressure at the junction and hoop stresses developed in the two tubes after shrinking on. Take $E = 2 \times 10^5$ N/mm^2. 15

UNIT–III

5. A disc of uniform thickness having inner and outer diameter 100 mm and 400 mm respectively is rotating at 5000 r.p.m. about its axis. Take $\rho = 7800$ kg/m^3, and $\mu = 0.28$. Determine the stress distribution along the radius of disc. 15

6. (a) What do you understand by Leaf Spring? 3

(b) A leaf spring is required to satisfy the following specifications : length = 0.75 m, load = 5 kN, width = 75 mm, maximum stress = 210 MN/m^2, maximum deflection = 25 mm and E = 200 GN/m^2. Find the number of leaves and their thickness. If the leaves become straight when this load in applied, find its radius of curvature. 12

UNIT–IV

7. A central horizontal section of a hook is a symmetrical trapezium of inner width = 67.5 mm and outer width = 22.5 mm. The depth of section is 90 mm. A load of 37.5 kN passes through the centre of curvature. The radius of the hook is 52.5 mm. Determine the maximum compressive and tensile stresses in the section of the hook. 15

8. A 40 mm × 40 mm × 5 mm angle is used as a simply supported beam over a span of 2·4 metres. It carries a load of 200 N along the vertical axis passing through the centroid of the section. Determine the resulting bending stresses on the outer corners of the section, along the middle section of the beam. 15

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44176

BT-4/J-25

MATERIALS ENGINEERING

Paper : ES-204A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) Explain crystal imperfections and their classifications. (9)

(b) Show that Atomic Packaging Factor for BCC crystal structure is 0.68. (6)

2. (a) Explain the following :

(i) Edge and screw dislocations.

(ii) Point defects and line defects. (8)

(b) Explain the Indian standard specifications for steel: based on ultimate tensile strength and based on composition as per BIS. (7)

UNIT–II

3. (a) Explain the iron carbon diagram for steel.

(b) What is Gibbs Phase Rule?

(c) Explain Binary phase diagram. (15)

4. (a) Explain the following heat treatment processes:
   (i) Annealing.
   (ii) Case Hardening.
   (iii) Surface hardening. (9)
   (b) Explain the major defects in metals and alloys due to faulty heat treatment process. (6)

UNIT–III

5. (a) Explain the Mechanism of Plastic deformation.
   (b) Differentiate between conventional and true stress strain curve for polycrystalline materials. (15)

6. Write a technical note on :
   (i) Theories of fatigue.
   (ii) Mechanism of fatigue failures.
   (iii) Types of creep. (15)

UNIT–IV

7. Explain any *two* :
   (i) Corrosion analysis.
   (ii) Weld and HAZ.
   (iii) Intergranular fracturing in context with metallography. (15)

8. Explain the following Material's characterization technique :
   (i) X ray diffraction.
   (ii) Atomic force microscopy.
   (iii) Atomic absorption microscopy. (15)

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44177

BT-4/J-25

APPLIED THERMODYNAMICS

Paper : MEC-202A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT–I

1. Give the construction and working of the following water tube boilers :

(i) Babcock and Wilcox boiler.

(ii) Lancashire boiler. (15)

2. (a) Enumerate the various accessories normally used in a steam generating plant. (7)

(b) What do you understand by steam jet draught? Where is it generally employed? (8)

UNIT–II

3. (a) Explain with a neat diagram the working of a Binary vapour cycle. (5)

(b) The adiabatic enthalpy drop across the prime mover of the Rankine cycle is 840 kJ/kg. The enthalpy of steam supplied is 2940 kJ/kg. If the back pressure is 0.1 bar, find the specific steam consumption and thermal efficiency. (10)

4. (a) Explain with the help of neat diagram a 'Regenerative Cycle'. Derive also an expression for its thermal efficiency. (8)

(b) Differentiate between simple and compound steam engine. State the advantages of compound steam engines. (7)

UNIT–III

5. Define the term 'steam nozzle'. Explain various types of nozzles. Derive the expression for critical pressure ratio for maximum discharge of a nozzle. (15)

6. (a) State and explain Dalton's law of partial pressures. (5)

(b) Steam having pressure of 10.5 bar and 0.95 dryness is expanded through a convergent-divergent nozzle and the pressure of steam leaving the nozzle is 0.85 bar. Find the velocity at the throat for maximum discharge conditions. Index of expansion may be assumed as 1.135. Calculate mass rate of flow of steam through the nozzle. (10)

UNIT –IV

7. (a) Explain the difference between an impulse turbine and a reaction turbine. (5)

   (b) What do you mean by compounding of steam turbines? Discuss various methods of compounding steam turbines. (10)

8. A single stage steam turbine is supplied with steam at 5 bar, 200°C at the rate of 50 kg/min. It expands into a condenser at a pressure of 0.2 bar. The blade speed is 400 m/s. The nozzles are inclined at an angle of 20° to the plane of the wheel and the outlet blade angle is 30°. Neglecting friction losses, determine the power developed, blade efficiency, and stage efficiency. (15)

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44178

BT–4/J–25

FLUID MECHANICS & FLUID MACHINES

Paper–MEC–204A

Time : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each unit. All questions carry equal marks. Assume any missing data suitably.

UNIT–I

1. (i) Explain Newton's law of viscosity. Differentiate between Newtonian and non-Newtonian fluids. (6)

   (ii) Define stream and potential functions. Does the velocity potential exist for two-dimensional incompressible flow prescribed by $u = x - 4y$; $v = -(y + 4x)$. If so, determine its form as well as that of stream function. (9)

2. (i) A horizontal pipe carrying water is gradually tapering. At one section the diameter is 150 mm and flow velocity is 1.5 m/s. (i) If the drop in pressure is 1.104 bar at a reduced section determine the diameter at the section. (ii) If the drop in pressure is 5 kN/m^2, what will be the diameter? Neglect losses. (7)

   (ii) Oil of specific gravity of 0.9 flows through a horizontal venturimeter of diameters 0.4 and 0.2 m. A U-tube

mercury manometer shows a head 0.63 m. Calculate the flow rate. (8)

UNIT–II

3. (i) Derive a relationship between pressure gradient and shear stress in a circular pipe. (5)

   (ii) A horizontal pipe of 5 cm diameter conveys an oil of specific gravity 0.9 and dynamic viscosity 0.8 kg/ms. Measurements indicate a pressure drop of 20 kN/m^2 per metre of pipe length traversed. Make calculations for the (i) flow rate of oil and centre line velocity, (ii) wall shear stress and the frictional drag over 100 m of pipe length, (iii) power of pump required assuming an overall efficiency of 60 percent, (iv) the velocity and shear stress at 1 cm from the pipe surface. (10)

4. (i) Define boundary layer and explain the fundamental causes of its existence. (5)

   (ii) A pipeline of 0.6 m diameter is 1.5 km long. To augment the discharge, another pipeline of the same diameter is introduced parallel to the first pipe in the second half of its length. Find the increase in discharge if the friction factor is 0.04 and head at the inlet is 30 m. (10)

UNIT–III

5. A centrifugal pump has an impeller of 0.75 m diameter and it delivers 1000 litres per second against a head of 65 m. The impeller runs at 1000 rpm and the width at the outlet is 6 cm. If the leakage loss is 3.5% of the discharge, and the external mechanical loss is 15 kW and the manometric efficiency is 85%, determine (i) the blade angle at the outlet, (ii) power required and (iii) efficiency of pump. (15)

6. The discharge Q in a device is a function of diameter D, speed N, mass density ρ, dynamic viscosity μ, surface tension σ and specific weight w. Show that

$$Q = D^3 N \phi \left(\frac{\mu}{\rho N D^2}, \frac{\sigma}{D^3 N^2 \rho}, \frac{w}{D N^2 \rho} \right). \qquad (15)$$

UNIT–IV

7. Design a Pelton wheel working under a head of 70 m. It develops 100 kW shaft power when it runs at 220 rpm. Assume the speed ratio as 0.45, coefficient of velocity as 0.98 and overall efficiency as 85%. (15)

8. (i) Explain the working principle of Francis turbine. (5)

   (ii) For a Kaplan turbine with a runner diameter 6.5 m, the discharge is 250 m^3/s and the hydraulic efficiency is stated to be 91%. The diameter of boss is 0.35 times the runner diameter. It develops 22.5 MW under a head of 12.5 m while running at 75 rpm. If the turbine discharges without whirl at exit, then determine (i) the overall efficiency of the turbine, (ii) flow ratio, (iii) speed ratio, (iv) degree of reaction, (v) specific speed of the turbine. (10)

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44179

BT-4/J-25

MECHANICS OF SOLIDS–II

Paper : MEC-206A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting *one* question from each unit. All questions carry equal marks. Assume any missing data.

UNIT–I

1. (a) A steel rod at 100 mm in diameter is 5 m long. Find the maximum instantaneous stress induced when a pull of 200 kN is suddenly applied to it. Find also the instantaneous elongation. Take E = 200 GPa. 5

(b) A steel rod of cross-sectional area 1000 mm^2 and 2 m long has a collar at its lower end, while its upper end is fixed. A weight of 200 N falling from height h and striking the collar produces an instantaneous maximum stress of 50 MPa in the rod. Assuming 5% energy loss during impact, determine the value of h. Take E = 200 GPa for steel. 10

2. Principal stresses at a point in an elastic material are 120 MPa tensile, 60 MPa tensile and 20 MPa compressive. Determine the factor of safety against the failure based on various theories. The elastic limit in simple tension is 240 MPa and Poisson's ratio 0.3. 15

UNIT–II

3. A cylindrical vessel whose ends are closed by means of rigid flange plates, is made of steel plate 4 mm thick. The length and the internal diameter of the vessel are 100 cm and 30 cm respectively. Determine the longitudinal and hoop stresses in the cylindrical shell due to an internal fluid pressure of 2 N/mm^2. Also calculate the increase in length, diameter and volume of the vessel. Take $E = 2 \times 10^5$ N/mm^2 and $\mu = 0.3$. 15

4. A compound tube is made of a tube 270 mm internal diameter 30 mm thick shrunk on a tube of 220 mm internal diameter. At junction radial pressure is 10 N/mm^2. The compound tube is subjected to an internal pressure of 70 N/mm^2. Find the variation of hoop stress over the wall of the compound tube. 15

UNIT–III

5. A disc of uniform thickness and 650 mm diameter rotates at 1850 r.p.m. Find the maximum stress developed in the disc. If a hole of 95 mm diameter is made at the centre of the disc, find the maximum values of radial and hoop stresses. Density of the material of the disc =7800 kg/m^3 and $\mu = 0.3$. 15

6. A laminated steel spring, simply supported at the ends and centrally loaded with a span of 0.75 m is repaired to carry a load of 7.5 kN and the central deflection is not to exceed 50 mm. The bending stress must not be greater than 400 MN/m^2. Plates are available in multiples of 4 mm for width. Determine the suitable value for the thickness, width and number of plates and the radius to which the plates should be formed. Assume the width to be twelve times the thickness. E = 200 GPa. 15

UNIT–IV

7. A crane hook whose horizontal cross section is trapezoidal 50 mm wide at the inner side, 25 mm wide at the outer side and 50 mm thick carries a load of 10 kN whose line of action is 60 mm from the inner edge of the section. The centre of curvature is 50 mm from the inside edge. Determine the maximum tensile and compressive stresses set up in the material. 15

8. A steel beam 50 mm × 25 mm in cross section is supported over a span of 1 m with one 50 mm face inclined at 30° to the vertical. A load of 600 N acts vertically at the centre of the span. Neglecting the weight of the beam, and assuming that the ordinary beam theory applies, find : (a) the maximum stress in the beam due to bending and (b) the magnitude and direction of the maximum deflection. E = 200 GPa. 15

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44180

BT-4/J-25

INSTRUMENTATION AND CONTROL

Paper : MEC-208A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT–I

1. (a) Define the following :

(i) Accuracy.

(ii) Precision.

(iii) Drift.

(iv) Sensitivity.

(v) Reproducibility.

(b) What do you mean by instrumentation? Write the objective of instrumentation. (10,5)

2. (a) What are different sources of errors? Explain each clearly.

(b) The refractive index (μ) of water is found to have the values 1.29, 1.33, 1.34, 1.35, 1.32, 1.36, 1.30 and 1.33. Calculate the mean value, absolute error, the relative error and the percentage error. (8,7)

UNIT–II

3. (a) Identify the factors to be considered for selection of transducer for a particular application.

   (b) A Quartz piezo-electric Crystal having a thickness of 2 mm and voltage sensitivity of 0.055 V-m/N is subjected to a pressure of 1.5 MN/m^2. Evaluate the voltage output. (8,7)

4. (a) Discuss the principle of capacitive transducer and explain how it is utilized for motion sensing?

   (b) A LVDT output is recorded by a self-balancing potentiometric recorder having its natural frequency of 10 Hz and damping ratio of 0.707. The LVDT is excited by 10 V at 50 Hz power supply. Estimate the maximum frequency of the displacement signal that can be recorded with an error of + 2%. (7,8)

UNIT–III

5. (a) Analyze the construction, principle, working of thermistor and its resistance temperature characteristics.

   (b) Explain the principle, construction, working and applications of ultrasonic Flow meters with neat sketches. (7,8)

6. (a) How humidity is measured? Explain the instrumentation required for humidity measurement.

   (b) What is a viscometer? Explain its principal, working in detail. (8,7)

UNIT–IV

7. (a) Explain the concept of a transfer function for a linear time invariant system. Derive the transfer function for simple second order mechanical system and represent it in frequency domain.

   (b) Explain the concept of signal flow graphs and their advantages over block diagram in certain scenarios. State and explain Mason's gain formula using one example. (7,8)

8. Compare and contrast pneumatic and hydraulic controllers based on; operating medium, operating pressure range, speed of response, force/torque capabilities etc. (15)

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BT-6/J-25 46186

ORGANIZATIONAL BEHAVIOR

HM-901A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. What kind of challenges faced by organizations due to workforce diversity in today's Scenario ? How organizations manage it effectively ? Also explain about management of behavioural issues by managers.

2. What are the approaches of Organizational behavior ? Explain with suitable examples.

Unit II

3. Define personality and its traits ? How the study of personality does help in understanding the Organizational behaviour ?

4. What do you mean by leadership ? Which styles and approaches are most relevant as well as effective in modern day business environment and why ?

Unit III

5. What are the key elements of motivation ? Discuss in detail the Maslow's need hierarchy theory and ERG theory of motivation.

6. Write down about the conflicts and negotiation ? What are the causes of group conflicts and how it can be managed by the organizations ?

Unit IV

7. Define stress at workplace, its causes & types. How can stress managed by different techniques ?

8. Explain the following :

   (a) Communication and its process

   (b) Organizational Change and resistance to change .

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BT-6/J-25 46203

MANUFACTURING TECHNOLOGY

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Explain the principles to follow while designing the gate and riser in the casting process. **10**

   (b) Explain any two types of allowances provided to patterns used in the casting process. **5**

2. (a) Recommend a suitable casting process for the production of pipes and cylinder liners and explain the working principle with suitable diagrams. **10**

   (b) Explain various steps involved in the centrifugal casting process. **5**

Unit II

3. (a) Explain the principle and theory of rolling process with a schematic diagram. **7**

(b) Outline the working principle of forward and backward extrusion process with the proper sketches. 8

4. (a) Explain the mechanism of shearing in sheet metal operation with neat sketch. 6

(b) Classify the different types of bending operations and explain them with suitable sketches. 9

Unit III

5. (a) Explain the electron beam welding process with a neat sketch and the merits, limitations and applications. 12

(b) Why flux is used in Arc welding ? Discuss. 3

6. Explain the different types of weld defects along with their remedies and mention how they occur ? 15

Unit IV

7. (a) Discuss about the powder conditioning methods adopted in Powder metallurgy. 8

(b) Differentiate various Mechanical and thermal methods of powder compaction. 7

8. (a) Illustrate with suitable sketch, the blow molding process for producing plastics serving bottles. 8

(b) Explain the process of compression moulding with neat diagram ? 7

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BT-6/J-25 **46204**

DESIGN OF MACHINE ELEMENTS

MEC-304A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Define factor of safety. How is the magnitude of factor of safety decided ? **5**

   (b) What are derating factors ? How these factors are used to determine the endurance limit of a component by approximate estimation ? **10**

2. Why the modified Goodman's diagram is preferred to design the components subjected to fluctuating loading ? **15**

Unit II

3. A rectangular steel plate is welded as a cantilever to a vertical column and supports a single concentrated load P, as shown in Fig. 1. Determine the weld size if shear stress in the same is not to exceed 140 MPa. **15**

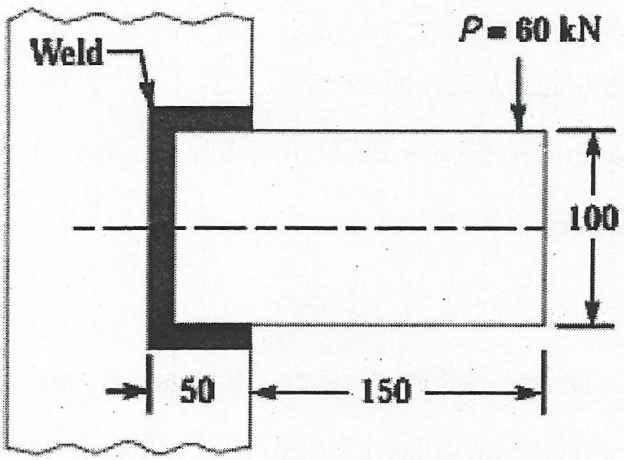

Fig.1

4. A steam boiler is to be designed for a working pressure of 2.5 N/mm^2 with its inside diameter 1.6 m. Give the design calculations for the longitudinal and circumferential joints for the following working stresses for steel plates and rivets: In tension = 75 MPa ; In shear = 60 MPa; In crushing = 125 MPa. **15**

Unit III

5. An overhang hollow shaft carries a 900 mm diameter pulley, whose centre is 250 mm from the centre of the nearest bearing. The weight of the pulley is 600 N and the angle of lap is 180°. The pulley is driven by a motor vertically below it. If permissible tension in the belt is 2650 N and if coefficient of friction between the belt and pulley surface is 0.3, estimate, diameters of shaft, when the internal diameter is 0.6 of the external. Neglect centrifugal tension and assume permissible tensile and shear stresses in the shaft as 84 MPa and 68 MPa respectively. **15**

6. A plate clutch having a single driving plate with contact surfaces on each side is required to transmit 110 kW at 1250 r.p.m. The outer diameter of the contact surfaces is to be 300 mm. The coefficient of friction is 0.4 : **15**

   (a) Assuming a uniform pressure of 0.17 N/mm^2; determine the inner diameter of the friction surfaces.

   (b) Assuming the same dimensions and the same total axial thrust, determine the maximum torque that can be transmitted and the maximum intensity of pressure when uniform wear conditions have been reached.

Unit IV

7. The radial load acting on a ball bearing is 2500 N for the first five revolutions and reduces to 1500 N for the next ten revolutions. The load variation then repeats itself. The expected life of the bearing is 20 million revolutions. Determine the dynamic load carrying capacity of the bearing. **15**

8. The following data is given for a 360° hydrodynamic bearing: radial load = 3.2 kN, journal speed = 1490 rpm, journal diameter = 50 mm, bearing length = 50 mm, radial clearance = 0.05 mm, viscosity of lubricant = 25 cP. Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing, calculate : **15**

   (i) coefficient of friction

   (ii) power lost in friction

   (iii) minimum oil film thickness

   (iv) flow requirement in litres/min

   (v) temperature rise.

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BT-6/J-25 46210

PRODUCT ENGINEERING

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Explain the utility of outline process chart in method study. Differentiate between outline process chart and flow process chart. **10**

   (b) State the objectives of method study. **5**

2. (a) Discuss in detail with definition and suitable illustration 'Man and Machine chart'. **9**

   (b) Define anthropometry and explain its importance. **6**

Unit II

3. (a) What are the characteristics of two bin system ? State the advantages and limitation of this system. **9**

(b) Describe the cost associated with the inventories. 6

4. The arrival rate of breakdown machines at a maintenance shop follows Poisson distribution with a mean of 4 per hour. The service rate of machines by a maintenance machine also follow Poisson distribution with a mean of 3 per hour. The downtime cost per hour of a breakdown machine is Rs. 200. The labour rate per hour is Rs 50. Determine the optimal number of maintenance mechanics to be employed to repair the machines such that the total cost is minimized. 15

Unit III

5. (a) Describe Exponential Smoothing Method of sale forecasting. State its advantages and limitations. 10

(b) Discuss long term forecasting. 5

6. A small engineering project consists of 6 activities namely A, B, C, D, E and F with duration of 4, 6, 5, 4, 3 and 3 days respectively. Draw the network diagram and calculate EST, LST, EFT, LFT and floats. Mark the critical path and find total project duration. 15

Unit IV

7. (a) What is value analysis ? What are its objectives ? How it differs from the value engineering ? **10**

   (b) Describe the stages in which value analysis is carried out. **5**

8. Write short notes on the following :

   (a) Quality function development **8**

   (b) Concurrent engineering. **7**

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Roll No. ..... Total Pages : 05

BT-6/J-25 **46250**

INTERNAL COMBUSTION ENGINES

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section. All questions carry equal marks.

Section A

1. (a) Determine the ideal efficiency of the diesel engine having a cylinder with bore 250 mm, stroke 375 mm and a clearance volume of 1500 cc, with fuel cut-off occurring at 5% of the stroke. Assume γ = 1.4 for air. 7

(b) Define mean effective pressure and comment its application in internal combustion engines. 3

(c) Draw the Otto, diesel and dual cycles on p-V and T-S diagrams, mark the various processes. 5

2. A compression ignition engine has a compression ratio of 10 and 2/3 of heat of combustion is liberated at constant volume and the remainder at constant pressure. The

pressure and temperature at the beginning are 1 bar and 27°C and the maximum pressure is 44 bar. Find the temperature at the end of compression and expansion, if it follows the law $pV^{1.35}$ = constant and $\gamma = 1.4$. **15**

Section B

3. (a) A two stroke CI engine develops a brake power of 310 kW while its frictional power is 73.6 kW. Its fuel consumption is 180 kg/h and works with an air fuel ratio of 22 : 1. The heating value of fuel is 42000 kJ/kg. Calculate : **9**

(i) Indicated power

(ii) Mechanical efficiency

(iii) Air consumption per hour

(iv) Indicated thermal efficiency and

(v) Brake thermal efficiency.

(b) Describe in brief the variables affecting delay period. Also discuss knocking in CI engines. **6**

4. (a) Define detonation. Also explain the various theories of detonation. **5**

(b) A 10 cm × 12 cm four cylinder, 4-stroke engine running at 2000 revolutions per minute has a

carburetor venturi with a 3 cm throat. Determine the suction at the throat assuming the volumetric efficiency of the engine to be 70 %. Assume the density of air to be 1.2 kg/m^2 and coefficient of air flow 0.8. **10**

Section C

5. A four stroke gas engine has a cylinder diameter of 25 cm and stroke 45 cm. The effective diameter of the brake is 1.6 m. The observations made in a test of the engine were as follows : **15**

Duration of test = 40 min

Total number of revolutions = 8080

Total number of explosions = 3230

Net load on the brake = 90 kg

Mean effective pressure = 5.8 bar

Volume of gas used = 7.5 m^3

Pressure of gas indicated in meter = 1.36 mm water of gauge

Atmospheric temperature minute = 17°C

Calorific value of gas = 19 MJ/m^3 at NTP

Rise in temperature of jacket cooling water = 45°C

Cooling water supplied = 180 kg

Draw up a heat balance sheet and estimate the indicated thermal efficiency and brake thermal efficiency. Assume atmospheric pressure as 760 mm of Hg.

6. (a) A two-cylinder four-stroke gas engine has a bore of 350 mm and a stroke of 575 mm. At 250 rpm the torque developed is 5.0 kN m. The air/fuel ratio is 8:1 by volume. The estimated volumetric efficiency is 85 % and the calorific value of the coal gas is 16,800 kJ/m^3. Calculate : **8**

(a) bp

(b) mean piston speed

(c) brake thermal efficiency of the engine.

(b) A single cylinder engine running at 1800 rpm develops a torque of 8 Nm. The indicated power of the engine is 1.8 kW. Find the loss due to friction power as the percentage of brake power. **4**

(c) Describe in brief the necessity of engine cooling. Also write the disadvantages of overcooling. **3**

Section D

7. Write short notes on the following : **15**

(i) Exhaust gas heat exchanger

(ii) Multi stage expansion with reheating between stages

(iii) Perfect intercooling of a two stage compressor.

(iv) Rotary air compressors.

8. (a) Write the various methods of emission control. Also discuss various alternative fuels for IC engines. 8

(b) With neat sketch, explain the multistage compression with intercooling with regards to gas turbine plant. 7

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ME 7th Spl/ Lib

Roll No. ..... Total Pages : 2

47344

BT-7/J-25

COMPUTER AIDED DESIGN

Paper : MEP-401A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT–I

1. (a) Explain the functional area of a basic CAD system and their applications in the design process. (9)

(b) Write a short note on product lifecycle management. (6)

2. (a) What is MAN? Give the advantage of MAN. (7)

(b) Briefly explain various techniques that can be used for image generation on computer terminals. (8)

UNIT–II

3. (a) What is Object oriented data base. (5)

(b) Drive the transformation matrix for the 2D rotation clockwise. (10)

4. Find the reflection matrix when axis of reflection is $y = 3x + 5$. (15)

UNIT–III

5. What is wireframe modelling? Explain its advantages, drawbacks and its applications. (15)

6. What is solid modelling? Discuss the role of set theory in solid modelling. (15)

UNIT–IV

7. Discuss surface of revolution and sweep surface in details. (15)

8. Explain hermit bicubic surface and Bezier surface in details. (15)

ME 8th / Lib.

Roll No. ..... Total Pages : 2

BT-8/J-25 **48368**

SUPPLY CHAIN MANAGEMENT

Paper–MEO-402A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. Discuss the goal of a Supply Chain and explain how supply chain decisions affect the success of a firm ? 15

2. What are World Class supply chains and how does location influence these supply chains ? Also, explain in brief the criterion to evaluate a supplier in a Supply chain. 15

UNIT–II

3. Discuss the role of supply Chain Drivers in creating strategic fit between the Supply Chain Strategy and COMPETITIVE Strategy. 15

4. A Speciality fertilizer company is considering expanding its operations into pan India, when five companies dominant the consumption of speciality fertilizers. What sort of distribution Network should this Company utilize ? 15

UNIT–III

5. What is the impact of uncertainty and how decision trees can be used the evaluate Network design in this Scenario ? 15

6. Discuss the difference between Lot-sized-based and Volume based quantity discounts and when are quantity discounts justified in a Supply Chain ? 15

UNIT–IV

7. Why is it important to consider uncertainty when evaluating supply chain design decision ? Also, explain how to manage supply chain cycle inventory ? 15

8. Explain the impact of Supply uncertainty on safety inventory. Also, discuss the methods of Forecasting in Supply chains. 15

Roll No. ..... Total Pages : 2

BT-8/J-25 **48372**

TOTAL QUALITY MANAGEMENT

Paper–MEO-410A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. (a) Compare the dimensions of Product Quality and Service Quality with example. 7

   (b) What are the obstacles to TQM implementation? Explain. 8

2. How would you summarize customer complaints, customer satisfaction and retention in details? 15

UNIT–II

3. (a) What is PDCA cycle? Illustrate PDCA cycle as an effective tool for continuous improvement with an example. 10

   (b) Discuss the importance of employee involvement and motivation for enhancing quality. 5

4. (a) Explain in detail the Six Sigma concepts of Process capability. 8

(b) Bring out the Methodologies adopted in Six Sigma Practices. 7

UNIT–III

5. What are the phases of QFD Process? Draw the house of quality for a Product of your choice and describe the QFD Methodology. 15

6. (a) List out the different situations where FMEA is to be carried out. Give detailed FMEA procedure. 12

(b) What do you mean by Benchmarking? 3

UNIT–IV

7. What is the need for ISO? Explain about the various processes used in ISO 9001 Quality Management System. 15

8. (a) Elucidate the implementation of Quality Audit in a manufacturing Industry. 10

(b) Brief the attributes of a good Auditor. 5

Roll No. ..... Total Pages : 2

BT–8/J-25 **48375**

AUTOMOBILE ENGINEERING

Paper–MEP–404A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. (a) What are the Merits and Demerits of four stroke engine?

   (b) Why we use single cylinder Air cooled two stroke petrol engine for two wheelers explain? 15

2. (a) What is the function of Clutch? Explain main parts of Clutch.

   (b) Write in detail about automatic transmission used. 15

UNIT–II

3. Explain about Gear box and its types. Explain in detail about epicyclic gearbox. 15

4. Write notes on the following : 15

(a) ABS. (b) AEB.

(c) Electronic stability control.

UNIT–III

5. (a) Describe the construction and working of a rear axle assembly. How does it transmit power from the differential to the wheels?

(b) List common problems that occur in a rear axle assembly. Explain the causes, symptoms and corrective measures for any three of them. 15

6. Explain the construction and working of a tandem master cylinder with a neat sketch. Mention advantages of disc brake over drum brakes. 15

UNIT–IV

7. Explain the stages of suspension system operation in an automobile. Identify common suspension system problems, their possible causes, and suggest troubleshooting methods. 15

8. (a) Describe the working of a power steering system, highlighting its advantages over manual steering.

(b) Define understeering and oversteering in automobiles. Explain their causes, effects on vehicle handling? 15

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BT–8/J-25 **48377**

WELDING TECHNOLOGY

Paper–MEP–408A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. 'During evolution of modern welding processes like laser Welding and Electronic beam welding from early processes like forge Welding and Gas welding ; extensive use of technology has been made over the years - explain. 15

2. Write briefly on the following :

   (a) Braze welding. 5

   (b) Thermal spraying. 5

   (c) Thermal cutting. 5

UNIT–II

3. Discuss the working principle, advantages and applications of arc welding processes. Discuss different classes of insulation. 15

4. Write briefly on the following :

(a) Methods to control welding current in welding transformers. 5

(b) AC and DC power sources. 5

(c) Factors affecting selection of Power sources. 5

UNIT–III

5. Write briefly on different types of flames and their effects on the Metal to be welded. 15

6. Write briefly on the following :

(a) Working principle of Gas welding. 5

(b) Gas cylinders and their handling protocol. 5

(c) Types of Welding torches. 5

UNIT–IV

7. Discuss mode of working and types of destructive and non-destructive testing for welds. 15

8. Write briefly on the following :

(a) TIG welding of Aluminum. 7

(b) MIG welding of Stainless steel. 8