USN [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]   **18ME52**

Fifth Semester B.E. Degree Examination, June/July 2023
Design of Machine Elements – I

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a. What are the factors to be considered for the selection for a machine component? **(06 Marks)**
    b. Explain the codes and standards used in Machine Design. **(04 Marks)**
    c. A point in a structural member subjected to a plane stress as shown in Fig.Q1(c). Determine the following :
        i) Normal and Tangential stress on a plane inclined at 45°.
        ii) Principal stresses and their direction
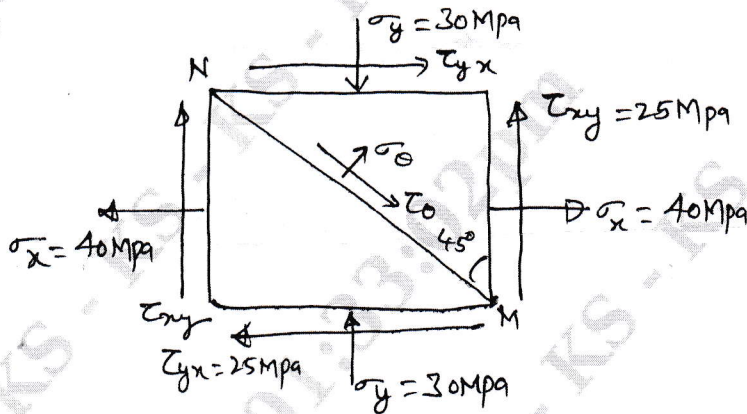   iii) Maximum shear stress and the direction of the plane on which it occurs.

Fig.Q1(c)   **(10 Marks)**

OR

2   a. Define stress concentration factor and discuss about the methods to reduce stress concentration factor. **(08 Marks)**
    b. A circular rod shaft of diameter of 50mm is subjected to load as shown in Fig.Q2(b). Determine the nature and magnitude of stresses at the critical points A and B.

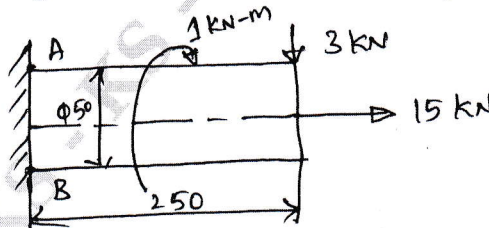Fig.Q2(b)   **(12 Marks)**

Module-2

3   a. Define Impact Stresses. Derive an expression for impact stresses in a axial bar of c/s 'A' and length 'L' due to the impact load of 'W' falling from a height 'h' from the collar. **(08 Marks)**

b. A cantilever beam made of cold drawn carbon steel (σ_u = 550 MPa, σ_y = 470 MPa, σ_{-1} = 275 MPa) of circular cross-section is subjected to load which varies from – F to 3F. Determine the maximum load that this member can withstand for an infinite life using a factor of safety of 2. [Refer Fig.Q3(b)] **(12 Marks)**
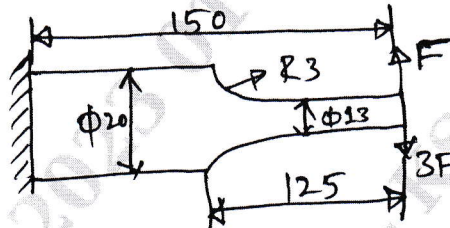

Fig.Q3(b)

OR

4 a. Define Endurance limit. Explain the effect of factors on Endurance limit. **(08 Marks)**

b. A hot rolled steel shaft is subjected to a torsional load that varies from 330 N-m (CW) to 110 Nm (CCW) as an applied bending moment at the critical section varies from +440 N-m to – 220 Nm. The shaft is of uniform cross section and no key way is present at the critical section. Determine the required shaft diameter. The material has an ultimate strength of 550 MN/m^2 and yield strength of 410 MN/m^2. Factor of safety = 1.5 size and surface correction are 0.85 and 0.62 respectively. Take the Endurance limit as half the ultimate strength. **(12 Marks)**

Module-3

5 A shaft is supported by two bearings placed 1m apart. A 500mm diameter pulley is mounted at a distance of 200mm to the right of left hand bearing and this drives a pulley directly below it with the help of belt having maximum tension of 3000N. The pulley weighs 1000N. Another pulley 300mm diameter is placed 300mm to the left of right hand bearing is driven with the help of electric motor and the belt which is placed horizontally to the right when viewed from the left bearing. This pulley weighs 500 N. The angle of contact for both the pulley is 180° and μ = 0.24. Determine suitable diameter for a solid shaft, assuming torque on one pulley is equal to torque on other pulley. Choose C15 steel (σ_y = 235.4 MPa, σ_u = 425 MPa) as the shaft material and use ASME code for the design of shaft, assume minor shock condition. **(20 Marks)**

OR

6 a. With neat sketch, explain the different types of keys. **(08 Marks)**

b. Design a flange coupling to connect the shafts of a motor and the centrifugal pump for the following specifications:
Pump output = 3000 liters/minute
Total head = 20 m
Pump speed = 600 rpm
Pump Efficiency = 70%
Select C-40 steel (σ_y = 328.6 MPa) for the shaft and C-35 steel (σ_y = 304 MPa) for bolts with factor of safety 2. Use allowable shear stress in cast iron flanges equal to 15 N/mm^2. **(12 Marks)**

Module-4

7 a. Design a triple riveted Lap Zig-Zag type, for a pressure vessel of 1.5m diameter. The maximum pressure inside the vessel is 1.5 MPa. The allowable stresses in tension, crushing and shear are 100, 125 and 75 MPa respectively. **(10 Marks)**

   b. A bracket is supported by means of 4 rivets of same size as shown in Fig.Q7(b). Determine the diameter of rivet, if the maximum shear stress is 140 N/mm^2.
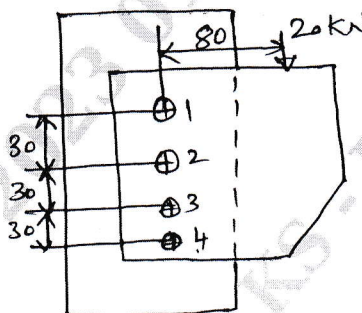
Fig.Q7(b) **(10 Marks)**

OR

8 a. A plate of 80mm wide and 10mm thick is to be welded to another plate by means of two parallel fillet welds. The plates are subjected to a load of 50 kN. Find the length of weld so that maximum stress does not exceed 50 N/mm^2. Consider the joint under static loading and then under dynamic loading. **(12 Marks)**

   b. A solid circular shaft 25mm in diameter is welded to a support by means of a fillet weld as shown in Fig.Q8(b). Determine the Leg dimensions of the weld, if the permissible shear stress is 95 N/mm^2.
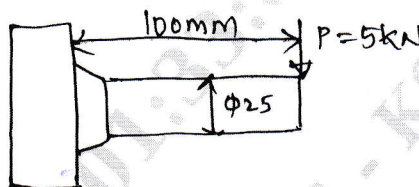
Fig.Q8(b) **(08 Marks)**

Module-5

9 a. Design a socket and spigot type cotter joint to sustain an axial load of 100 kN. The material selected for the joint has the following design stresses σ_f = 100 N/mm^2 , σ_c = 150 N/mm^2 and τ = 60 N/mm^2. **(14 Marks)**

   b. Explain self locking and over hauling in power screws. **(06 Marks)**

OR

10 a. Derive an equation for torque required to lift the load on square threaded screw. **(10 Marks)**

   b. A split nut used with a lead screw is propelled at a speed of 5 m/min, against a load of 20 kN, along the spindle of a square thread (single start) having nominal diameter of 30mm and pitch of 6mm. The axial thrust is absorbed by collar of 100mm outside diameter and 70mm insider diameter. Determine, (i) Power required (ii) Height of bronze nut required if allowable bearing pressure is 17 MPa. (iii) Efficiency of the drive. **(10 Marks)**

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18ME53

Fifth Semester B.E. Degree Examination, June/July 2023
Dynamics of Machines

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the following terms with neat diagrams:
   (i) Equilibrium of three force system
   (ii) Equilibrium of two force and a torque   **(06 Marks)**

   b. A four-link mechanism with the following dimensions is acted upon by a force 100 N $\angle 150°$ N on the link DC [Fig.Q1(b)]. AD = 500 mm, AB = 400 mm, BC = 900 mm and DC = 750 mm, DE = 350 mm. Determine the input torque T on the link AB for the static equilibrium of the mechanism for the given configuration.
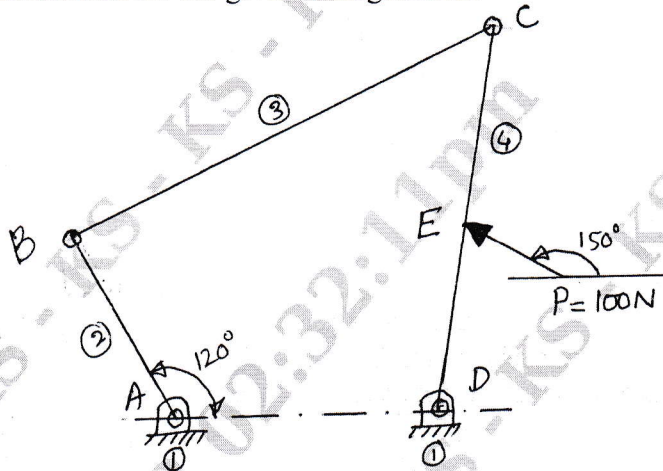
Fig.Q1(b)   **(14 Marks)**

OR

2 a. State and explain D'Alembert's principle.   **(06 Marks)**

   b. The following data relate to a horizontal reciprocating engine:
   Mass of reciprocating parts = 120 kg
   Crank length = 90 mm
   Engine speed = 900 rpm
   Connecting rod:
   Mass = 90 kg
   Length between centers = 450 mm
   Distance of center of mass from big end center = 180 mm
   Radius of gyration about an axis through center of mass = 150 mm
   Find the magnitude and the direction of the inertia torque on the crankshaft when the crank has turned 30° from inner dead center.   **(14 Marks)**

Module-2

3 a. What do you mean by static balancing and dynamic balancing? Explain.   **(06 Marks)**

b. Four masses A, B, C and D are completely balanced. Masses C and D make angles of 90° and 195° respectively with that of mass B in the counter clockwise direction. The rotating masses have the following properties:

Mass of B = 25 kg   Radius of mass A at A plane = 150 mm

Mass of C = 40 kg   Radius of mass B = 200 mm

Mass of D = 35 kg   Radius of mass D = 180 mm

Planes B and C are 250 mm apart. Determine the :

(i)   Mass A and its angular position with that of mass B

(ii)   Positions of all the planes relative to plane of mass A.   **(14 Marks)**

OR

4   a. Explain complete balancing of reciprocating parts.   **(05 Marks)**

   b. The cranks of a foul-cylinder marine oil engine. Cranks are arranged at angular intervals of 90°. The engine speed is 70 rpm, and the reciprocating mass per cylinder is 800 kg. The inner cranks are 1 m apart and the outer are 2.6 m apart. The inner cranks are symmetrically arranged between the outer cranks. Each crank is 400 mm long.

      Determine the firing order of the cylinders for the best balance of reciprocating masses and also the magnitude of the unbalanced primary couple for that arrangement.   **(15 Marks)**

Module-3

5   a. Derive the expression for equilibrium speed of porter governor.   **(08 Marks)**

   b. Each arm of a porter governor is 250 mm long. The upper arms are pivoted to links of 40 mm from the axis of rotation. The lower arms are pivoted to links of 50 mm from the axis of rotation. Each ball has a mass of 5 kg and the central mass is 50 kg. The force of friction on the sleeve of the mechanism is 40 N. Determine the range of speed of the governor for extreme radii of rotation of 125 mm and 150 mm respectively.   **(12 Marks)**

OR

6   a. Explain gyroscopic couple effect on steering, pitching and rolling with respect to naval ship.   **(06 Marks)**

   b. What is angle of heel? Explain its importance.   **(02 Marks)**

   c. An aeroplane flying at 300 kmph turns towards the left and completes a quarter circle of 60 m radius. The mass of rotary engine and propeller of the plane is 450 kg with a radius of gyration of 320 mm. The engine speed is 2000 rpm clockwise when viewed from the rear. Determine the gyroscopic couple on the aircraft and state its effect.

      In what way is the effect changed when the (i) aeroplane turns towards right   (ii) engine rotates clockwise when viewed from the front (nose end) and aeroplane turns left. **(12 Marks)**

Module-4

7   a. Explain energy method to find natural frequency of spring-mass-system.   **(06 Marks)**

   b. What is the effect of spring mass? Derive the expression for natural frequency of the system.   **(06 Marks)**

c. Determine the frequency of vibration of the system shown in Fig.Q7(c). Use the following data m = 10 kg, K_1 = 200 N/m, K_2 = 400 N/m.
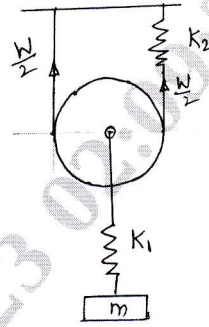
Fig.Q7(c)   **(08 Marks)**

OR

8   a. Setup the differential equation for a spring mass damper system and obtain complete solution for the under-damped condition.   **(10 Marks)**
    b. Determine :
        (i)   Critical damping coefficient
        (ii) Damping factor
        (iii) Natural frequency of damped vibrations
        (iv) Logarithmic decrement
        (v)   Ratio of two consecutive amplitude of vibrating system which consists of mass of 30 kg, a spring of stiffness 1800 N/m and a damper. The damping provided is only 15% of the critical value.   **(10 Marks)**

Module-5

9   a. Derive the expression for the maximum displacement for forced vibration of undamped single degree freedom system.   **(08 Marks)**
    b. Explain vibration isolation.   **(02 Marks)**
    c. A machine of total mass 18 kg is mounted on springs having stiffness K = 12000 N/cm. A piston within the machine has a mass of 2 kg has a reciprocating motion with stroke 7.5 cm and speed 6000 rpm. Assuming the motion to be SHM. Determine:
        (i)   Amplitude of vibration
        (ii) Transmissibility
        (iii) Force transmitted to the ground to foundation.
        Take ξ = damping ratio = 0.2.   **(10 Marks)**

OR

10 a. Define critical speed and explain its types.   **(05 Marks)**
    b. A shaft supported freely at the ends has a mass of 120 kg placed 250 mm from one end. The shaft diameter is 40 mm. Determine the natural frequency of the transverse vibrations if the length of the shaft is 700 mm. Take E = 200 GN/m^2.   **(05 Marks)**
    c. The following data relate to a horizontal shaft held in long bearings.
        Length of the shaft = 1.2 m
        Diameter of the shaft = 14 mm
        Mass of rotor at mid point = 16 kg
        Eccentricity of center of mass of rotor from center of rotor = 0.4 mm
        E = 200 GN/m^2
        Permissible stress in the shaft material = 70×10^6 N/m^2
        Determine the critical speed of the shaft and the range of speed over which it is unsafe to run the shaft. Neglect mass of the shaft.   **(10 Marks)**

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Fifth Semester B.E. Degree Examination, June/July 2023
Turbo Machines

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of steam tables is permitted.

Module-1

1   a. Explain the significance and use of :
   (i) Flow coefficient (ii) Head coefficient
   (iii) Power coefficient (iv) Specific speed of turbomachine **(08 Marks)**
   b. A low pressure air compressor develops a pressure of 1.147 bar and temperature of 320 K if the initial pressure and temperature are 1.01 bar and 305 K respectively. Determine compressor and polytropic efficiency. **(06 Marks)**
   c. Distinguish static and stagnation properties. Why are stagnation properties preferred to static properties for use in the analysis of turbomachine processes? **(06 Marks)**

OR

2   a. What is a reheat factor? Prove that the overall isentropic expansion efficiency is more than the individual stage isentropic expansion efficiency. **(08 Marks)**
   b. Define with the help of temperature entropy diagram for expansion:
   (i) Mechanical efficiency (ii) Adiabatic efficiency
   (iii) Overall efficiency (iv) Total-Total efficiency **(08 Marks)**
   c. A centrifugal pump operating at the best efficiency point produces a head of 26 m and delivers 1 m³/sec of water when rotating at 1500 rpm. Its impeller diameter is 0.5 m. If a geometrically similar pump of impeller diameter 0.8 m is operating at 1200 rpm, calculate the discharge and head. **(04 Marks)**

Module-2

3   a. Derive an Euler's turbine equation for turbomachine. State the assumptions made in the derivation. **(10 Marks)**
   b. A centrifugal pump of 1.5 m diameter runs at 210 rpm and pumps 1.8 m³/sec of water. The vanes are set back with an angle 25° at exit. Assuming radial entry and velocity of flow throughout is 2.5 m/sec. Determine the power required to drive the pump. If the manometric efficiency of the pump is 65%. Find the average lift of the pump. **(10 Marks)**

OR

4   a. Discuss the effect of discharge blade angle on degree of reaction and energy transfer in the radial flow turbo machine. Assume the radial fluid entry at the inlet. **(10 Marks)**
   b. Air enters a rotor in an axial flow turbine with a tangential component of the absolute velocity equal to 600 m/sec in the direction of rotation. At the rotor exit the tangential component of absolute velocity is 100 m/sec in the direction opposite to that of the rotational speed. The tangential blade velocity is 250 m/sec. Evaluate total enthalpy change across the rotor, the change in total temperature across the rotor and the power developed if the mass flow rate is 10 kg/sec. Take the value of C_p = 1.005 kJ/kgK for air. **(10 Marks)**

Module-3

5 a. What are the methods used in reducing the speed of turbine rotor? Explain any one method of reducing speed with necessary sketches. **(10 Marks)**

   b. In a reaction turbine, the blade tips are inclined at 35° and 20° in the direction of rotor. The blades are the same shape as the moving blades but reverted in the direction at certain place in the turbine. The drum is 1 m diameter and the blades are 10 cm high of this place the steam has a density of 1.042 kg/m^3. If the speed of the turbine is 250 rpm and the steam passes through the blade without shock find the mass flow rate of the steam and power developed, taking absolute velocity of the steam as 32 m/sec. **(10 Marks)**

OR

6 a. Explain the working of a single stage reaction type steam turbine, with relevant diagrams. **(10 Marks)**

   b. Derive an expression for maximum blade efficiency of a single stage impulse turbine with the help of velocity triangles. **(10 Marks)**

Module-4

7 a. Explain with a neat sketch the set up of Kaplan Turbine. Where it is suited? **(10 Marks)**

   b. Determine the power given by the jet of water to the runner of a pelton wheel which is having tangential velocity as 20 m/sec. The net head on the turbine is 50 m and discharge through the jet is 0.03 m^3/sec. the side clearance angle is 15° and take $C_V = 0.975$. **(10 Marks)**

OR

8 a. What is a draft tube? Why it is used in reaction turbine? Describe with sketch any two types of draft tube. **(10 Marks)**

   b. A Kaplan turbine working under a head of 20 m develops 11772 KW shaft power. The outer and hub diameter of runner is 3.5 m and 1.75 m respectively. The hydraulic and overall efficiency of the turbine are 0.88 and 0.84 respectively. If the velocity of whirl is zero at outlet. Determine: (i) Runner vane angles at inlet and outlet   (ii) Speed of the turbine. **(10 Marks)**

Module-5

9 a. With a neat diagram show different heads and efficiencies that are used in the study of centrifugal pumps. **(10 Marks)**

   b. The diameter ratio of the impeller of a centrifugal compressor is 2 and the pressure ratio is 4. At a speed of 12000 rpm the flow rate is 10 m^3/sec of free air. The isentropic efficiency of the compressor is 94%. The blades are radial at the outlet and the entry is radial at the inlet. The velocity of flow remains constant at 60 m/sec through the impeller. Calculate:
   (i)   Power input to the machine
   (ii) The impeller diameter at inlet and outlet the suction is from the atmosphere at 100 kPa and 300 K.
   Take for air $C_p = 1.004$ kJ/kgK and $\gamma = 1.4$ **(10 Marks)**

OR

10 a. What is slip factor? Explain how does it affect the performance of the centrifugal compressor. **(06 Marks)**

   b. Explain what net positive suction head of a centrifugal pump. **(04 Marks)**

   c. The blade angles at inlet and outlet of the impeller of a centrifugal pump are 55° and 75° and the corresponding diameters are 3 cm and 6 cm respectively. The blade width at outlet is 0.75 cm. The speed is 1500 rpm. The entry of water is radial without any whirl component. The velocity of flow remains constant in the impeller. Draw the velocity triangles and calculate : (i) Specific work   (ii) Flow rate   (iii) Power of the machine
   (iv) The manometric head. The hydraulic efficiency may be taken as 0.85. **(10 Marks)**

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18ME55

Fifth Semester B.E. Degree Examination, June/July 2023
Fluid Power Engineering

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a. State Pascal's law. Explain with a neat sketch the structure of fluid power system. **(08 Marks)**
    b. Explain the desirable properties of hydraulic fluids. **(08 Marks)**
    c. Explain the sources of contamination of hydraulic fluids. **(04 Marks)**

OR

2   a. Explain with a neat sketches the different types of seals used in fluid power system. **(08 Marks)**
    b. With a neat circuit diagram explain suction line filter and pressure line filter. **(06 Marks)**
    c. Explain the working of air cooled heat exchanger with the aid of sketch. **(06 Marks)**

Module-2

3   a. With a neat sketch explain the working of external gear pump. Obtain an expression for volumetric displacement, theoretical flow rate and volumetric efficiency. **(10 Marks)**
    b. A pump having displacement of 140 cm^3 is driven at 1440 rpm and operates against a maximum pressure of 150 bar. The volumetric efficiency is 0.9 and overall efficiency is 0.8 find (i) Pump delivery in LPM (ii) The input power required in KW (iii) The torque at the pump shaft. **(10 Marks)**

OR

4   a. Explain with a neat sketch the operation of balanced vane motor. **(08 Marks)**
    b. With a neat sketch explain Spring loaded accumulator. **(06 Marks)**
    c. A hydraulic motor has a 100 cm^3 volumetric displacement. If it works at 140 bar pressure and receives fluid at a theoretical flow rate of 0.001 m^3/s. Determine
    i) Speed of the motor
    ii) Theoretical torque
    iii) Theoretical Power developed **(06 Marks)**

Module-3

5   a. With a neat sketch explain the working of pressure Relief valve and pressure compensated flow control valve. **(10 Marks)**
    b. Explain the working of meter-in and meter-out circuit for controlling the speed of hydraulic cylinder. **(10 Marks)**

OR

6   a. List the various types of control valves. With a neat sketch explain the working of 3/2 sliding spool valve. **(10 Marks)**
    b. Explain with a neat circuit diagram the working of a Regenerative circuit. Obtain an expression for extending speed of the piston. **(10 Marks)**

Module-4

7 a. Explain with a neat sketch the pneumatic control system. **(08 Marks)**
   b. Sketch and explain the mechanism end position cushioning of pneumatic cylinder. **(08 Marks)**
   c. List the characteristics of compressed air. **(04 Marks)**

OR

8 a. Explain with the help of neat sketch Quick-Exhaust Valve. **(08 Marks)**
   b. Explain the working of Air Filter with the aid of neat sketch. **(06 Marks)**
   c. With the help of simple sketch explain pneumatic cylinder mounting methods. **(06 Marks)**

Module-5

9 a. Explain with a neat circuit diagram supply air throttling and exhaust air throttling. **(10 Marks)**
   b. Explain the functions of 'OR' and 'AND' gates with Shuttle Valve and twin pressure valve respectively. **(10 Marks)**

OR

10 a. Explain the controlling of pneumatic cylinders in a sequence as $A^+ \, B^+ \, B^- \, A^-$ by cascading method. **(12 Marks)**
   b. Explain Electro-Pneumatic Control of single acting cylinder with a suitable circuit. **(08 Marks)**

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CBCS SCHEME

Fifth Semester B.E. Degree Examination, June/July 2023
Operation Management

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define the terms :
      i) Production   ii) Production System.   **(04 Marks)**
   b. What is Decision Making? Is decision making a Science? Justify. Explain steps involved in Decision Making.   **(10 Marks)**
   c. Explain the functions of any Business Organization.   **(06 Marks)**

OR

2 a. Explain the distinguishing characteristics of Products versus Services.   **(06 Marks)**
   b. Explain factors affecting Productivity.   **(06 Marks)**
   c. A Company manufactures and sells a product at Rs 320 each. The fixed cost was Rs 3,00,000 and the variables cost per product was Rs 20. What is the contribution per product? What is the Break – even Quantity?   **(08 Marks)**

Module-2

3 a. What is Forecasting? Show the classification of Forecasting.   **(06 Marks)**
   b. The demand of a product of a certain company is shown below :
      Using a time period value of n = 3 and use simple Moving Average method, determine the following :
      i)   Forecasts for each period.
      ii) Deviations, Mean Deviation.
      iii) Absolute Deviation, Mean Absolute Deviation.

Week :	1	2	3	4	5	6	7
Demand / units	180	190	210	195	205	215	210

                                                                      (14 Marks)

OR

4 a. What is Forecasting? Explain the steps in Forecasting process.   **(08 Marks)**
   b. A firm believes that its annual profit depends on its expenditures for research. The following datas are given. Estimate the profit when expenditure is 6 units.

Year :	1989	1990	1991	1992	1993	1994
Expenditure :	2	3	5	4	11	5
Annual profit :	20	25	34	30	40	31

                                                                      (12 Marks)

Module-3

5 a. Define the terms :
      i) Design capacity   ii) System capacity   iii) System efficiency.   **(06 Marks)**
   b. Explain the Long term and Short term strategies of Capacity planning.   **(08 Marks)**

c. A plastics firm has four work centres A, B, C, D in series with individual capacities (units / day) and actual output as shown below :
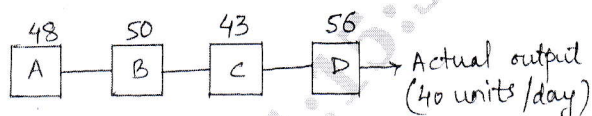
Determine : i) System Capacity   ii) System Efficiency. **(06 Marks)**

OR

6 a. What is the need and importance of Factory Location Decision? **(10 Marks)**
   b. Explain the systematic process in finding a good Location. **(10 Marks)**

Module-4

7 a. Explain the flow chart of Aggregate planning and Master Production Schedule. **(10 Marks)**
   b. Define Master Scheduling. Explain. **(05 Marks)**
   c. A Chemical Company has developed a forecast as shown below. It uses a K factor of 0.8. if the actual demand is 11500 units in April, what modified scheduled quantity should be scheduled for June.

Month	Forecaste	Actual
April	12000	11500
May	16000	-
June	14000	-

(05 Marks)

OR

8 a. Explain the strategies of Aggregate Planning. **(10 Marks)**
   b. Explain Master Scheduling Methods. **(10 Marks)**

Module-5

9 a. What is MRP? Explain the structure of MRP. **(10 Marks)**
   b. The projected requirements of a Company are given below. The Economic Order Quantity (EOQ) is 300 units and the Lead time is 2 weeks. The material available in hand is 100 units. Prepare a detail Materials requirement plant.

Week :	1	2	3	4	5	6	7	8
Required :	80	-	-	120	-	120	-	100

(10 Marks)

OR

10 a. Explain the difference between Purchasing , Procurement and Supply Chain Management. **(10 Marks)**
   b. What is a Vendor? Explain the process of Vendor development. **(10 Marks)**

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Fifth Semester B.E Degree Examination, June/July 2023
Environmental Studies
(COMMON TO ALL BRANCHES)

Time: 2 hrs.]   [Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the hundred questions, each question carries one mark.

2. Use only **Black ball point pen** for writing / darkening the circles.

3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.

4. Darkening two circles for the same question makes the answer invalid.

5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. How many parts are there in the forest ecosystem?
   a) One   b) Two   c) Three   d) Four

2. On which factor forest type is mainly dependent
   a) Abiotic   b) Size of forest
   c) Shape of Trees   d) Production from the trees

3. The forest cover in India has recently increased due to
   a) Increase in natural forest growth
   b) Increase in net sown area
   c) Plantation by different agencies
   d) None of the above

4. What is not entirely correct about desert?
   a) It is dry and hot   b) Waterless
   c) Without shelter   d) All of these

5. Who have learnt to live under very hot and dry conditions
   a) People   b) Plants   c) Animals   d) All of these

6. The term wet land implies
   a) Land covers by rain water only
   b) Slow moving water covered wet ground
   c) Water logged wet ground
   d) Fast moving water covered wet ground

7. World Wetland day celebrated every year on _____ February
   a) 2nd b) 3rd c) 4th d) 15th

8. World's most saltiest sea is
   a) Mediterranean Sea   b) Dead Sea   c) Callibben Sea   d) Black Sea

9. Atmosphere contains 79 percent Nitrogen and 21 percent Oxygen by
   a) Volume   b) Weight   c) Density   d) All of these

10. In complex ecosystem the degree of species diversity is
    a) Poor   b) High   c) Medium   d) None

11. The organisms who directly feed on producers are called
    a) Herbivores   b) Carnivores   c) Decomposers   d) Sprophytes

12. Abiotic component includes
    a) Soil   b) Water   c) Temperature   d) All of these

13. Which of the following is the climatic factor
    a) Pressure   b) Humidity   c) Temperature   d) All of these

14. The basic requirements of human beings are provided by
    a) Industrialization   b) Agriculture   c) Nature   d) Urbonization

15. Which atmospheric sphere is closest to the earth surface?
    a) Troposphere   b) Stratosphere   c) Mesosphere   d) Exosphere

16. A food web consists of
    a) A portion of a food chain
    b) An organism position in a food chain
    c) Interlocking food chains
    d) A set of similar consumers

17. The pyramid of energy is
    a) Always upright   b) Always inverted
    c) Both uplight and inverted   d) None of these

18. Which is the most stable ecosystem
    a) Mountain   b) Desert   c) Forest   d) Ocean

19. 'Earth Day' is held every year on
    a) June 5th b) November 23rd c) April 22nd d) Jan 10th

20. Which of the following is absorbed by green plants from the atmosphere?
    a) Carbon dioxide   b) Water   c) Nutrients   d) All of these

21. The most commonly used chemicals in the artificial cloud seeding
    a) Silver iodide   b) Sodium chloride   c) Dry ice   d) All of these

22. Bhopal disaster is a kind of _____
    a) Natural disaster   b) Manmade disaster   c) None of (a) & (b)   d) Other

23. National disaster management is headed by
    a) Prime minister   b) President of India
    c) Governor of states   d) Chief minister of states.

24. Disaster management includes
    a) Mitigation   b) Reconstruction   c) Rehabilitation   d) All of these

25. Floods can be prevented by _____
    a) Attorestation   b) Cutting the forest
    c) Tilling the land   d) Removing the top soil

26. Which of the following is not a type of primary source
    a) Crude oil   b) Coal   c) Hydrogen energy   d) Sunlight

27. Which of these energy resources are widely used in industries?
    a) Coal and Gasoline   b) Wood   c) Biogas   d) Crop residue

28. What does OTEC stands for?
    a) Ocean thermal energy cultivation
    b) Ocean thermal energy conversion
    c) Ocean techno energy conversation
    d) Ocean thermal energy consumption

29. What is the basic requirement for hydro electric power station?
    a) Reservoir   b) Turbine   c) Power house   d) Penstock

30. Photovoltaic cell converts solar energy into
    a) Heat energy   b) Electrical energy   c) Mechanical energy   d) Chemical energy

31. Which of the following is non-renewable resource?
    a) Coal   b) Forests   c) Water   d) Wildlife

32. Both power and manure is provided by :
    a) Nuclear plants   b) Thermal plants   c) Biogas plants   d) Hydroelectric plant

33. At what range of speed is the electricity from the wind turbine is generated
    a) 100 – 125 Mph   b) 450 – 600 Mph   c) 200 – 250 Mph   d) 30 – 35 Mph

34. What is used to turn wind energy into electrical energy
    a) Turbine   b) Generator   c) Yaw motor   d) Blades

35. What type of energy is wind energy?
    a) Renewable   b) Non-Renewable   c) Conventional   d) Commercial

36. How is OTEC caused?
    a) By wind energy   b) By geothermal energy
    c) By solar energy   d) By gravitational force

37. Series of parallel combination of the solar cell is known as _____
    a) Solar array   b) Solar light   c) Solar sight   d) Solar eye

38. Materials used for making solar cell is _____
    a) Silicon   b) Carbon   c) Sodium   d) Magnesium

39. Quarries are generally
    a) Open pits   b) Surface coal mines
    c) Underground mines   d) Explosive mines

40. When the minerals are located to deep in the ground, the method used for mining is
   a) Open pit method   b) Quarries   c) Surface mining   d) Sub surface mining

41. Major pollution causing agent is
   a) Man
   c) Hydrocarbon gases
   b) Animals
   d) None of these

42. The result of ozone hole is
   a) Acid rain   b) UV radiations   c) Global warming   d) Green house effect

43. Which of the following causes out break of jaundice
   a) Air pollution   b) Water pollution   c) Thermal pollution   d) Soil pollution

44. Minamata disease caused by pollution of water by
   a) Mercury
   c) Tin
   b) Lead
   d) Methyl ISD Cyanate

45. Noise is measured using sound meter and the unit is
   a) Hertz   b) Decibel   c) Joule   d) Sound

46. Air pollution causes
   a) Global warming
   c) Soil erosion
   b) Respiratory problems
   d) None of these

47. Intake of lead may primarily cause damage of the _____
   a) Brain   b) Liver   c) Lung   d) Kidney

48. According to WHO maximum permissible level of chlorides in drinking water is _____
   a) 100 mg/L   b) 600mg/L   c) 800mg/L   d) 200mg/L

49. The main source of water pollution is _____
   a) Sewage water
   c) Acid rain
   b) Industrial pollutants
   d) None of these

50. What is the health effects of excess fluoride in drinking water
   a) Fluoros's   b) Toothaches   c) Lung disease   d) Brain problem

51. Bacteria and micro organisms present in water will cause _____ in human and animals
   a) Indigestion   b) Intestinal tract   c) Brain tumor   d) Cancer

52. Why it is difficult to recycle plastics?
   a) It is very hard
   b) It comes in different sizes
   c) It is adhesive
   d) It contains different types of polymer resins

53. The disposable wastes contain
   a) Solids   b) Slurries   c) Liquids   d) All of these

54. Identify the following ones which can be recycled many times
   a) Plastic   b) Wood   c) Aluminum   d) Organic materials

55. Noise pollution limits at residential area
   a) 80 dB   b) 45 dB   c) 90dB   d) 120dB

56. Which of the following make e-waste hazardous in nature
    a) Glass   b) Plastic   c) Lead   d) Iron

57. What is the hazardous pollutant released form LED's?
    a) Barium   b) Arsenic   c) Cobalt   d) Cadmium

58. What is the hazardous pollutant released form batteries?
    a) Arsenic   b) Cadmium   c) Copper   d) Cobalt

59. What proportion of health care waste is hazardous waste
    a) 25%   b) 15%   c) 50%   d) 80%

60. What is the hazardous waste released from telephones
    a) Barium   b) Copper   c) Lithium   d) Lead

61. Which of the following contains most water
    a) Atmosphere   b) Biosphere   c) Ground water   d) Lakes and Rivers

62. Hard water contains large amount of _____
    a) Lead   b) Sodium   c) Calcium   d) Silicon

63. Water that is good enough to drink is called _____
    a) Potable water   b) Ground water   c) Surface water   d) Artesian water

64. The pH value of acid rain water is
    a) 5.7   b) 7.0   c) 8.5   d) 7.5

65. The primary cause of acid rain around the world is _____
    a) CFC   b) SO_2 c) CO   d) O_3

66. Acid rain can be controlled by
    a) Reducing SO_2 and NO_2 emissions
    b) Reducing oxygen emissions
    c) Increasing number of lakes
    d) Increasing the forest cover

67 The effect of acid rain
    a) Reduces soil fertility
    b) Increases atmospheric temperature
    c) Causing respiratory problem
    d) Skin cancer

68 Major compound responsible for the destruction of stratospheric ozone layer is
    a) Oxygen   b) CFC   c) CO_2 d) Methane

69. Ozone layer thickness is measured in
    a) PPM   b) PPB   c) Decibles   d) Dobson units

70. Normal average thickness of stratospheric ozone layer across the globe is around
    a) 5 PPM   b) 300 DU   c) 400 DU   d) 500 DU

71. Chloro Fluro Carbon's (CFC) are
    a) Non-toxic   b) Non – Flammable
    c) Non Carcinogenic   d) All of these

72. Breathing radon over time causes
    a) Lung cancer   b) Oral cancer   c) Skin cancer   d) All of these

73. Radon gas is
    a) Inert   b) Colorless   c) Odorless   d) All of these

74. Ozone depletion causes
    a) Snow blindness   b) Photochemical smog
    c) Acid rain   d) Vomiting

75. World ozone day is observed on
    a) November 16   b) October 16   c) Jan 16   d) September 16

76. A great way to reduce acid rain is
    a) Use of solar power
    b) Use of wind power
    c) User of hydropower
    d) All of these

77. Ozone layer was first discovered over
    a) Arctic   b) Antarctical
    c) Tropical Region   d) Africa

78. Animal husbandry results in
    a) Global warming   b) Acid rain
    c) Ozone depletion   d) None of these

79. Formation of ozone layer is explained by
    a) Rosenmund reaction
    b) Henderson's reaction
    c) Chapman's reaction
    d) Perkin's reaction

80. The main cause of acid rain is
    a) Soil pollution   b) Water pollution   c) Air pollution   d) All of these

81. Remote sensing technique makes use of properties of _____
    a) Electric waves   b) Sound waves
    c) Electromagnetic waves   d) Wind waves

82. The attitude distance of a geostationary satellite from earth is about
    a) 26,000 km   b) 30,000 km   c) 36000 km   d) 44000 km

83. The changes in the reflectivity/emissivity with time is called
    a) Spectral variation   b) Spatial variation
    c) Temporal variation   d) None of these

84. Which one of the following helps to find objects on the earth surface
    a) Atmospheric window   b) Signature
    c) Radiometric error   d) None of these

85. Orbital radius of GPS satellites is approximately
    a) 15000km   b) 26600km   c) 18400km   d) 36100km

86. GIS stands for
    a) Geographic Information System
    b) Generic Information System
    c) Geological Information System
    d) Geographic Information Sharing

87. GIS deals with what kind and data
    a) Numeric data   b) Binary data   c) Spatial data   d) Complex data

88. Among the following _____ is example of hardware
    a) Arc GIS   b) Auto CAD   c) Digitization   d) Mouse

89. Among the following which do not come under components of GIS?
    a) Hardware   b) Software   c) Compiler   d) Data

90. The relation between velocity, wave length and frequency is
    a) $\lambda = cf$ b) $\lambda = c/f$ c) $\lambda = c^2 f$ d) $\lambda = cf^2$

91. A short – term EIA (Environmental Impact Assessment) has a time period of
    a) 2 – 5 years   b) 10 – 15 years   c) 5 – 10 years   d) 5 – 7 years

92. EIA commenced in the year
    a) 1960's   b) 1890's   c) 1880's   d) 1950's

93. How many strategies are there in EIA
    a) 5   b) 3   c) 2   d) 4

94. Which is the first Country to pass the Amendment in the Parliament to safeguard the environment?
    a) India   b) Brazil   c) China   d) Denmark

95. ISO 14000 standards are for the
    a) Quality Management System
    b) Environmental Management System
    c) Administration
    d) Supply Chain

96. Who among the following is the most celebrated environmental activist in contemporary India?
    a) Anna Hazare
    b) Medha Patkar
    c) Vasundhara Raje
    d) Arvind Kejrival

97. What is the full form of NGO?
    a) Non – Governmental Organization
    b) No Governance Organization
    c) Non-Governance Organization
    d) Null Governmental Organization

98. When did Green peace founded
    a) 1965   b) 1967   c) 1968   d) 1971

99. When did Wild Protection Act included in the Constitution of India.
    a) 1980   b) 1972   c) 1920   d) 1992

100. When did World Nature Organization (WNO) be established?
    a) 2000   b) 2001   c) 2010   d) 2014

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