CBCS SCHEME

USN | | | | | | | | | | |

18ME51

Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025
Management and Economics

Time: 3 hrs. Max. Marks: 100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. Use of interest factor table is permitted.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Define management and explain the characteristics of management. **(08 Marks)**
b. Define planning and briefly discuss the steps involved in planning. **(08 Marks)**
c. Briefly explain different levels of management. **(04 Marks)**

OR

2 a. Explain the various steps in decision making process with a block diagram. **(12 Marks)**
b. Explain briefly the contribution of F.W Taylor for the scientific management. **(08 Marks)**

Module-2

3 a. List the different types of organization, explain briefly line and staff organization with a chart. **(10 Marks)**
b. Define motivation and explain briefly different leadership styles. **(10 Marks)**

OR

4 a. Explain Maslow's hierarchy of need theory in brief. **(10 Marks)**
b. What is controlling and explain the steps in controlling process **(10 Marks)**

Module-3

5 a. Explain briefly the following :
i) Law of demand
ii) Law of supply
iii) Equilibrium point
iv) Elasticity of demand
With demand/supply graph v/s price. **(10 Marks)**
b. Find the effective rate of interest for an actual rate of interest of 8% when compounded :
i) Yearly ii) Biannually iii) Quarterly iv) Daily. **(06 Marks)**
c. Differentiate between micro and macro economics. **(04 Marks)**

OR

6 a. Define law of returns and explain the three phases of law of returns. **(06 Marks)**
b. A 45 years old person is planning for his retired life. He plans to invest Rs. 2500/- every month in a private Chitfund which assures him a rate of interest 11% compounded monthly. Find the maturity value of his account when he is 60 years old. **(06 Marks)**
c. A person wants to gift a car to his daughter when she would turn 18 years six years from now. He decides to put away money in her name during her next six birth days. He wants to deposit Rs. 25,000/- in the first year and go on increasing it by Rs. 5000/- every year for the next 6 years. If he estimates that a car would cost Rs. 5 lakhs when he wants to buy, how much more money should be added to the maturity amount that he receives from the bank. If it is assumed to grow at compounded 11.5% annually. Draw the cash flow diagram. **(08 Marks)**

Module-4

7 a. Define present worth and explain the conditions for present worth comparison. **(10 Marks)**

b. The following alternatives are available to accomplish an objective of 12 years duration.

	Plan 'A'	Plan 'B'	Plan 'C'
Life cycles (Y)	6	3	4
First cost (Rs.)	2000	8000	10,000
Annual cost (Rs.)	3200	700	500

Compare the present worth of the alternatives using interest rate of 7 percent (7%). **(10 Marks)**

OR

8 a. Explain briefly rate of returns :
i) MARR
ii) IRR
iii) ERR. **(10 Marks)**

b. A company has developed a unique prototype and spent Rs. 5 lakhs. A return of Rs. 7 lakhs is expected at the year end and it is expected to fetch Rs. 3 lakhs for the next three years calculate the rate of returns for his prototype. **(10 Marks)**

Module-5

9 a. Discuss the various causes of depreciation. **(05 Marks)**

b. List and explain five methods of depreciation. **(08 Marks)**

c. A company has purchased an equipment whose first cost is Rs.1,00,000 with an estimate life of 8 years. The estimated salvage value of the equipment at the end of its life time is Rs. 20,000. Find the depreciation and book value for the 5 years using the sum of the years digit method of depreciation. **(07 Marks)**

OR

10 a. Explain how selling price is determined for a product with a neat diagram. **(08 Marks)**

b. Explain briefly the standard cost and marginal cost. **(04 Marks)**

c. A factory produces CFL tubes in batches of 1000. The direct material cost for a batch is Rs. 1600 and direct labour cost is Rs. 2000. The factory overheads is 32 percent of material and labour costs. Selling and distribution cost are 20 percent of factory cost. If the management wants to make a profit of 20 percent of gross cost. Determine the selling price of each tube. **(08 Marks)**

* * * * *

CBCS SCHEME

USN | | | | | | | | | | |

18ME52

Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025
Design of Machine Elements – I

Time: 3 hrs. Max. Marks: 100

Note:1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of design data hand book is permitted.
3. Assume suitable missing data.

Module-1

1 a. Define mechanical engineering design, Explain the steps involved in design with a block diagram. **(08 Marks)**

b. Determine the max stress induced in the semicircular grooved shaft as shown in Fig. Q1 (b), if it is subjected to,
(i) An axial load of 50 kN
(ii) A bending moment of 500 Nm.
(iii) A twisting moment of 400 Nm. **(12 Marks)**

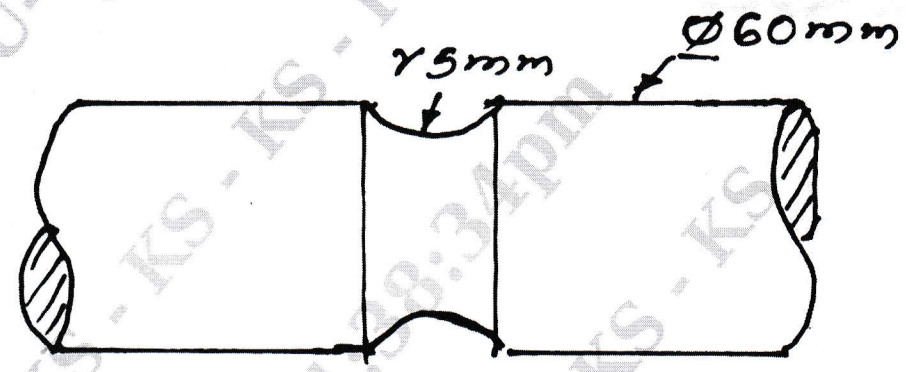

Fig. Q1 (b)

OR

2 a. Define stress concentration and discuss about the methods (any two) to reduce stress concentration. **(08 Marks)**

b. A Cantilever beam of rectangular cross section with a depth of 200 mm is subjected to an axial tensile load of 50 kN and a transverse load of 40 kN acting downwards at the free end of 500 mm length beam. The material of the beam has allowable tensile stress of 80 N/mm^2. Determine the width of rectangular section of the beam. **(12 Marks)**

Module-2

3 a. Derive an expression for impact stress in an axial bar of cross section 'A' and length 'L' due to the impact load of 'W' falling from a height 'h' on the collar. **(08 Marks)**

b. A Cantilever beam of rectangular section with the depth twice the width is subjected to varying load that varies from 6 KN downwards to 2 KN upwards. If the span is 100 mm, determine the dimensions of cross section of the beam. The material has yield strength of 400 N/mm^2 and a tensile strength of 560 N/mm^2. Assume no stress raisers, size factor and surface finish factors as 1. Factor of safety is 2. **(12 Marks)**

OR

4 a. Explain with neat sketches, the different types of varying stresses. **(06 Marks)**

b. A beam of 400 mm depth I-section is resting on two supports 6 m apart. It is loaded by a weight of 5 KN falling through a height of 10 mm and striking the beam at mid point. Moment of Inertia of the section is 12×10^7 mm^4. Take Modulus of Elasticity of 2×10^5 N/mm^2. Determine,

(i) Impact stress
(ii) Impact factor
(iii) Instantaneous max deflection
(iv) Instantaneous max load. **(14 Marks)**

Module-3

5 A shaft mounted between bearings 1200 mm apart receives a power of 20 kW at 1000 rpm through a pulley 600 mm diameter located 400 mm from the left bearing from antoher pulley directly below it. The power is delivered through a gear of 200 mm diameter located 700 mm from the left bearing to another gear in front of it. The shaft rotates clockwise when viewed through the left bearing. The belt has ratio of tensions of 2.5 and the gear is of 20° pressure angle. The weight of the pulley is 500 N and that of the gear is 200 N. Determine the shaft diameter if the shaft material has yield shear stress of 180 MPa and factor of safety is 3. Take shock and endurance factors for bending and torsion as 1.5 and 1.00 respectively. **(20 Marks)**

OR

6 a. Prove that a square key is equally strong in shear and compression. **(06 Marks)**

b. A Cast Iron Flange coupling is used to connect two shafts of 80 mm diameter. The shaft runs at 250 rpm and transmits a torque of 4300 N.m. The permissible shear stress for key and bolt materials is 50 MPa and permissible shear stress for Flange material is 8 MPa. Design the Flange key and bolts for the coupling. **(14 Marks)**

Module-4

7 a. Explain with neat sketch, the failure of rivets. **(06 Marks)**

b. Determine the size of weld required for an eccentricity loaded weld as shown in Fig.Q7 (b). The allowable stress in the weld is 75 MPa. **(14 Marks)**

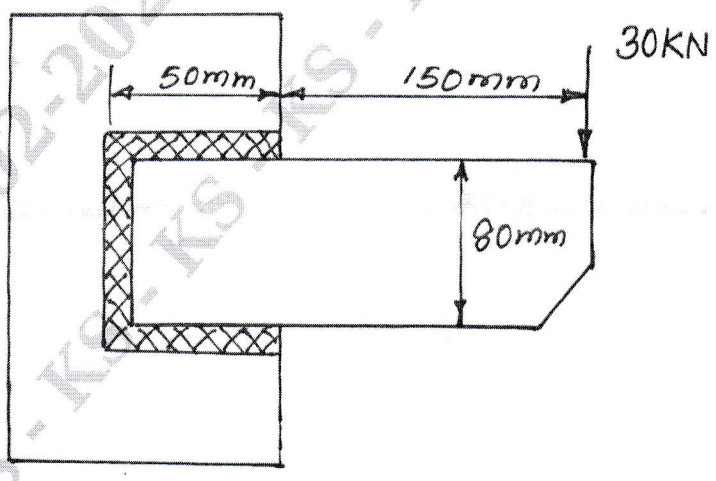

Fig. Q7 (b)

OR

8 a. A plate of 80 mm wide and 10 mm thick is welded to another plate by means of two parallel welds. Shear stress at the joint is 75 N/mm^2. Determine the length of weld of the plates are subjected to a load of 50 kN. **(06 Marks)**

b. Design a double riveted butt joint with two cover plates for the longitudinal seam of a boiler shell 1.5 m in diameter subjected to a steam pressure of 0.9 MPa. Assume joint efficiency of 75%. Allowable stress in tension for the plate is 83 MPa in compression 138 MPa and shear stress in rivets may be assumed as 55 MPa. Assume chain riveted joint. **(14 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:
$\sigma_t = 100$ N/mm^2, $\sigma_c = 120$ N/mm^2, $\tau = 60$ N/mm^2. **(10 Marks)**

b. A single threaded power screw of 25 m diameter with a pitch of 5 mm is used take a maximum load of 500 N. The coefficient of frictions are 0.05 for the collar and 0.08 for the screw. The frictional diameter of the collar is 30 mm. Find the torque required to raise and lower the load. Also find the efficiency of the power screw. **(10 Marks)**

OR

10 a. Explain self locking and overhaul in power screws. **(05 Marks)**

b. A square threaded power screw has a nominal diameter of 30 mm and a pitch of 6 mm with double start. Load on the screw is 6 kN and the mean diameter of the trust collar is 40 mm. The co-efficient of friction for screw is 0.1 and for collar is 0.09. Determine

(i) Torque required to raise load.
(ii) Torque required to lower the load.
(iii) Overall efficiency
(iv) Is the screw self locking? **(15 Marks)**

* * * * *

CBCS SCHEME

USN | | | | | | | | | | |

18ME53

Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025
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. What are conditions for a body to be in equilibrium under the action of two forces, three forces and two forces and a torque? **(06 Marks)**

b. A slider crank mechanism with the following dimensions is acted upon by a Force F = 2 KN at B as shown in Fig. Q1 (b). OA = 100 mm, AB = 450 mm. Determine the input torque T on the link OA for the static equilibrium of the mechanism for the given configuration.

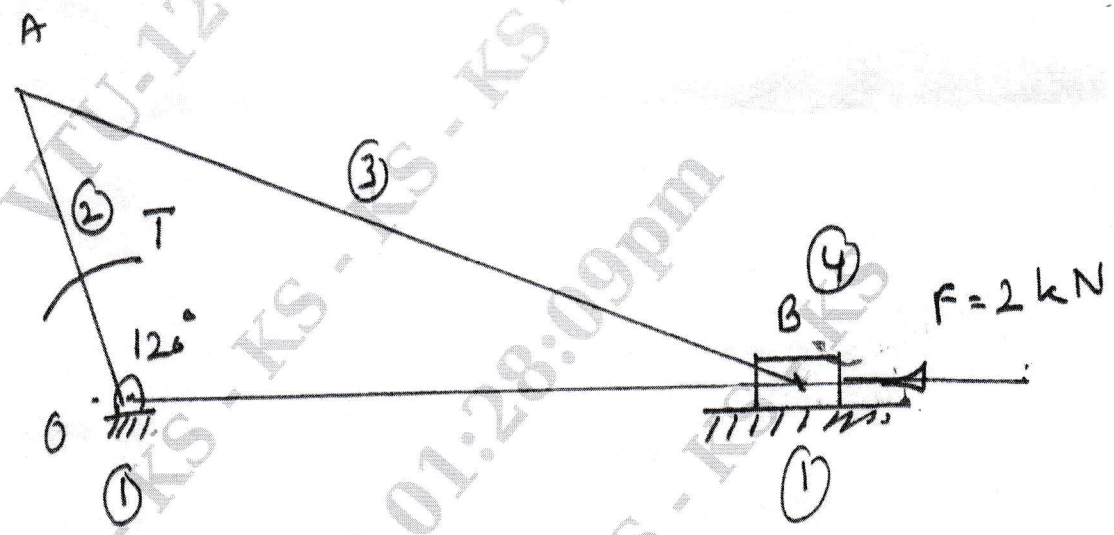

Fig. Q1 (b) **(14 Marks)**

OR

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

b. The Crank and connecting rod of a vertical petrol engine, running at 1800 rpm are 60 mm and 270 mm respectively. The diameter of the piston is 100 mm and the mass of the reciprocating part is 1.2 kg. During the expansion stroke when the crank has turned 20° from the top dead centre, the gas pressure is 650 KN/m^2. Determine the

(i) Net force on the piston
(ii) Net load on the gudgeon pin.
(iii) Thrust on the cylinder walls.
(iv) Speed at which the gudgeon pin load is reversed in direction. **(14 Marks)**

Module-2

3 a. What is meant by static and dynamic unbalance in machinery? Why balancing is necessary for rotors of high speed engines. **(06 Marks)**

b. Three masses of 8 kg, 12 kg and 15 kg are attached at radial distance of 80 mm, 100 mm and 60 mm respectively to a disc on a shaft are in complete balance. Determine the angular position of the masses of 12 kg and 15 kg relative to 8 kg mass. **(14 Marks)**

OR

4 a. What do you mean by primary unbalance in reciprocating engine? **(05 Marks)**

b. The following data relate to a single cylinder reciprocating engine :
Mass of reciprocating part = 40 kg
Mass of revolving part = 30 kg at crank radius
Speed = 150 rpm,
Stroke = 350 mm
If 60% of the reciprocating parts and all the revolving parts are to be balanced,
Determine the
(i) Balance mass required at a radius of 320 mm
(ii) Unbalanced force when the crank has turned 45° from the top deed centre. **(15 Marks)**

Module-3

5 a. Explain the terms sensitiveness, hunting and stability relating to governor. **(06 Marks)**

b. Each arm of a porter governor is 250 mm long. The upper and lower arms are pivoted to the links at 40 mm and 50 mm respectively from the axis of rotation. Each ball has a mass of 5 kg and the sleeve mass is 50 kg. The force of friction on the sleeve mechanism is 40 N. Determine the range of speed of the grievance for the extreme radii of 125 mm and 150 mm **(14 Marks)**

OR

6 a. Explain the gyroscopic effect of steering pitching and rolling of ship moving in sea. **(06 Marks)**

b. An aeroplane makes a complete quarter circle of 40 m radius towards left when flying at 175 km/hr. The mass of rotary engine and propeller is 400 kg with radius of gyration 300 mm. The engine runs at 2500 rpm clockwise when viewed from the rear. Find the gyroscopic couple on the aircraft. In what way is the effect changes when aeroplane turns towards right. **(14 Marks)**

Module-4

7 a. With a neat sketch, explain longitudinal vibration, transverse vibration, torsional vibration. **(10 Marks)**

7 b. Determine the equation of motion and natural frequency of the system shown in Fig. Q7 (b) using Newton's method. **(10 Marks)**

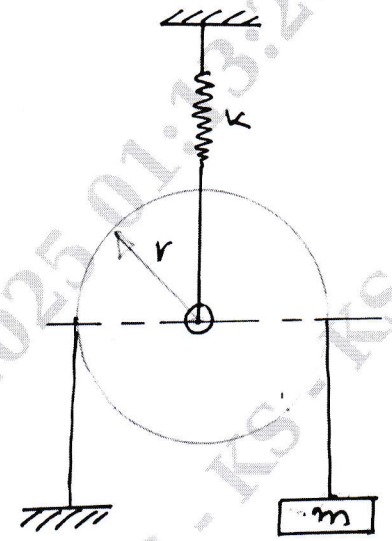

Fig.Q7 (b)

OR

8 a. Define Logarithmic decrement and derive the equation for same. **(10 Marks)**

b. A spring mass damper system has m = 3 kg K = 100 N/m, C = 3 N-S/m. Determine
(i) Damping factor
(ii) Natural frequency of damped vibration
(iii) Logarithmic decrement
(iv) The ratio of two successive amplitudes
(v) Number of cycles after which the original amplitude is below 20%. **(10 Marks)**

Module-5

9 a. Define : (i) Magnification factor (ii) Critical speed of the shaft
(iii) Vibration isolation (iv) Transmissibility ratio. **(10 Marks)**

b. A machine total mass 200 kg is supported on springs of total stiffness 1600 kN/m has unbalanced rotating element which results is a disturbing force 800 N at a speed of 3,000 rpm. Assuming $\xi = 0.2$. Determine
(i) Amplitude of motion due to unbalanced and its phase angle.
(ii) Transmissibility. **(10 Marks)**

OR

10 a. Obtain Natural frequency of free transverse vibration due to point load. **(10 Marks)**

b. A steel shaft simply supported in bearings 50 mm diameter and 1.5 m long carries a solid rotor of weight 1600 N at its centre, find its critical speed if E = 200 GN/m^2. **(10 Marks)**

* * * * *

CBCS SCHEME

USN | | | | | | | | | | |

18ME54

Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025
Turbo Machines

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Compare turbo machines and positive displacement machines. **(06 Marks)**

b. Define the following for a trubomachine.
i) Flow coefficient ii) Power coefficient iii) Capacity coefficient **(06 Marks)**

c. A turbine model wolking under a head of 2m runs at 170 rpm and has a diameter of 1m. A prototype turbine develops 22 MW under a head of 250 m with a specific speed of 100. Calculate: i) Scale ratio ii) Power development by the model. **(08 Marks)**

OR

2 a. Define total to total, total-to-static, static-to-static and static-total efficiencies for power generator and power absolving turbo machine with the help of T-S diagram. **(10 Marks)**

b. Air flows through an air turbine where its stagnation pressure is decreasing in the ratio 5:1. Total to total efficiency is 0.8 and air flow rate is 5 Kg/s. The inlet total temperature is 280K. Calculate :
i) Actual power output
ii) Actual exit total temperature
iii) Actual exit static temperature if the exit flow velocity is 100 m/s and
iv) Total-to-static efficiency of the device. **(10 Marks)**

Module-2

3 a. Derive an expression for maximum utilization factor in an axial flow type :
i) Impulse turbine and ii) 50% Reaction turbine. Draw also the velocity triangles. **(10 Marks)**

b. In an radial inward flow turbine, the degree of reaction is 0.8 and utilization factor is 0.9. The tangential speeds of wheel at the inlet and outlet are 11m/s and 5.5 m/s. Draw the velocity triangle at inlet and outlet assuming radial velocity is constant and equal to 5 m/s. Flow is radial at exit. Find the power output for a volumetric flow rate 2 m^3 of water per second. **(10 Marks)**

OR

4 a. A radial outward flow machine has no inlet whirl. The blade speed at the exit is twice that at inlet. Radial velocity is constant throughout. Taking the inlet blade angle as 45 degree show that degree of action, $R = \frac{2+\cot\beta_2}{4}$. Where β_2 is the blade angle at exit with respect to tangential direction. **(10 Marks)**

b. The mean rotor blade speed of an axial flow turbine with 50% reaction is 210 m/s. Steam emerges from the nozzle inclined at 28° to the plane of wheel with axial component equal to blade speed. Assuming symmetrical inlet and outlet velocity triangle, find :
   i) Rotor blade angles
   ii) ii) Utilization factor. Find also
   iii) Degree of reaction to make the utilization factor maximum, if the axial velocity blade speeds as well as nozzle angle remains constant. **(10 Marks)**

Module-3

5 a. Define compounding. Explain any two types of compounding with a neat sketch, showing variations of pressure and velocity of the stream. **(10 Marks)**

b. Steam emerges from a nozzle to an impulse De-Laval turbine with a velocity of 1000m/s. The nozzle angle is 20°. The mean blade speed is 400 m/s. The blades are symmetrical. The mass flow rate of steam is 1000 Kg/hr. Friction factor is 0.8. Calculate the following – i) Blade angles ii) Axial thrust iii) Work done per Kg of steam iv) Power developed. **(10 Marks)**

OR

6 a. Derive the expression for maximum efficiency of impulse steam turbine and show that maximum efficiency is $[\cos^2 \alpha_1]$. **(10 Marks)**

b. The following data refers to a particular stage of a Parson's reaction turbine. Speed of the turbine = 1500 rpm. Mean diameter of rotor = 1m, Stage efficiency = 0.8, blade outlet angle = 20°. Speed ratio = 0.7. Determine the available isentropic enthalpy drop in the stage. **(10 Marks)**

Module-4

7 a. Derive an expression for maximum hydraulic efficiency of pelton wheel. **(10 Marks)**

b. A double jet pelton wheel is required to generate 7500 KW when the available head at the base of the nozzle is 400 m. The jet is deflected through 165° and the relative velocity of the jet is reduced by 15% in passing over the buckets. Determine the i) Diameter of each jet ii) Total flow iii) Force exerted by the jets in the tangential direction. Assume generator efficiency is 95%, overall efficiency = 80% and speed ratio = 0.47. **(10 Marks)**

OR

8 a. Define the following :
   i) Functions of draft tube ii) Hydraulic efficiency iii) Overall efficiency
   iv) Mechanical efficiency v) Volumetric efficiency. **(10 Marks)**

b. Following data are given for a Francis turbine net head = 60m, speed = 700 rpm, Power at the shaft = 294.3 KW, Overall efficiency = 84%, hydraulic efficiency = 93%, flow ratio = 0.2, width ratio = 0.1, outer diameter to inner diameter ratio = 2. Thickness of vane occupy 5% of circumference area of runner velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine :
i) Guide blade angle ii) Runner vane angles iii) diameter of runner at inlet and outlet iv) width of wheel at inlet. **(10 Marks)**

Module-5

9 a. Define :
i) Manometric efficiency
ii) Manometric head **(04 Marks)**

b. Derive an expression for minimum starting speed of pump. **(06 Marks)**

c. A centrifugal pump runs 950 rpm. its outer and inner diameter are 500 mm and 250 mm. The vanes are set back at 35° to the wheel rim. If the radial velocity of water through the impeller is constant at 4 m/s, find
i) vane angle at inlet ii) velocity of water at outlet iii) Direction of water at outlet and iv) work done per kg of water. Entry of water at inlet is radial. **(10 Marks)**

OR

10 a. Define :
i) Slip factor ii) Power input factor. **(04 Marks)**

b. Explain: i) Surging ii) Choking iii) Pre notation. **(06 Marks)**

c. A centrifugal compressor running at 6000 rpm having an impeller tip diameter of 101 cm has the following test data :
i) Mass flow rate = 25 Kg/s
ii) Static pressure ratio = 2.12
iii) Pressure at inlet = 100 KPa, temperature at inlet = 28°C
iv) Mechanical efficiency = 0.97.
Find :
i) Slip coefficient
ii) Temperature of air at exit
iii) Power input
iv) Power coefficient **(10 Marks)**

* * * * *

CBCS SCHEME

USN | | | | | | | | | | |

18ME55

Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025
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. Define Fluid power and list various advantages. **(05 Marks)**
b. List the various applications of fluid power systems. **(05 Marks)**
c. With a neat symbolic represent and explain the components of hydraulic system. **(10 Marks)**

OR

2 a. What are the various functions of hydraulic fluids? **(05 Marks)**
b. Define Pascal's law and explain with an example. **(05 Marks)**
c. With a neat sketch explain the pressure line and suction line filtering. **(10 Marks)**

Module-2

3 a. Classify the various types of the positive displacement pump. **(05 Marks)**
b. A gear pump has a outside diameter of 100 mm, inside diameter 80 mm and a width of gear 25 mm. If the actual flow of pump is 95 ℓpm and at pump speed is 1440 rpm. What is the volumetric displacement, theoretical discharge and volumetric efficiency. **(05 Marks)**
c. With a neat sketch explain the construction and working of external gear pump. **(10 Marks)**

OR

4 a. With a neat sketch explain the pumping theory. **(05 Marks)**
b. Classify the various types of an accumulators. **(05 Marks)**
c. With a neat sketch explain the hydraulic cylinder cushioning. **(10 Marks)**

Module-3

5 a. With a neat sketch explain the working of shuttle valve. **(05 Marks)**
b. List with symbolic diagram of various types of pressure control valves used in fluid power systems. **(05 Marks)**
c. Explain the working of 4/2 solenoid operated direction control valve. **(10 Marks)**

OR

6 a. With a neat sketch explain the working of needle valve. **(05 Marks)**
b. Explain the controlling of single acting cylinder with the neat circuit. **(05 Marks)**
c. With a neat circuit explain the working of regenerative circuit. **(10 Marks)**

Module-4

7 a. Write short notes on filter-regulator-lubricator (FRL), used in pneumatic systems. **(05 Marks)**

b. With a neat sketch explain the construction and working of double acting cylinder. **(05 Marks)**

c. What is the function at a seal? Explain the wiper seal with a neat sketch. **(10 Marks)**

OR

8 a. Name the various components used in pneumatic system and its fluid power symbols. **(05 Marks)**

b. With a neat sketch explain the construction and working of 2/2 Ball seated poppet valve. **(05 Marks)**

c. With a neat circuit explain the application of quick exhaust valve. **(10 Marks)**

Module-5

9 a. Explain the indirect actuation of double acting pneumatic cylinder using memory valve with a suitable circuits. **(10 Marks)**

b. With a neat sketch explain the direct control of single acting pneumatic cylinder using electro – pneumatic control. **(10 Marks)**

OR

10 Explain the working of pneumatic circuit in the following sequencing of two cylinders using cascading method for the sequence of A^+ B^+ B^- A^-. **(20 Marks)**

* * * * *

CBCS SCHEME

USN | | | | | | | | | | |

18ME56

Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025
Operations Management

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. What is Operations Management? Identify the three major functional areas of business organizations and describe how they are interrelated. **(10 Marks)**

b. A firm manufactures two products A and B on which the profits earned per unit are Rs.3 and Rs.4 respectively. Each product is processed on two machines M_1 and M_2. Product A requires one minute of processing time on M_1 and two minutes on M_2. Product B requires one minute each on machine M_1 and M_2. Machine M_1 is available for not more than 7 hours 30 minutes per day, while machine M_2 is available for 10 hours per day. Find the number of units of products A and B to be manufactured to get maximum profit. Solve graphically. **(10 Marks)**

OR

2 a. What is productivity? List the various measures of productivity. **(04 Marks)**

b. What is decision making? Describe the steps in decision making. **(10 Marks)**

c. A firm of compiling the monthly of productivity report for its Board of Directors. From the following data, compute :

i) Labour productivity
ii) Machine productivity
iii) Mulit-factor productivity of rupees spent on labour, machine, materials and energy. The average labour rate is Rs. 15/hour, and the average machine usage rate is Rs.10/hour.

Units produced = 1,00,000
Labour hours = 10,000
Machine hours = 5,000
Cost of materials = Rs. 35,000
Cost of energy = Rs.15,000. **(06 Marks)**

Module-2

3 a. What is demand forecasting? What are the reasons for an organization to carry out demand forecasting? Give a broader classification of forecasting methods. **(08 Marks)**

b. The manager of a 'building construction materials' company has collected the demand data for a specific material (in tons) for the past eight periods. The demand for this material is based on the number of construction permits approved by the local authority.

Construction permits	15	9	40	20	25	25	15	35
Demand (tons)	6	4	16	6	13	9	10	16

i) Plot a graph of number of instruction permits vs demand and check for a linear relationship.
ii) Develop a regression model and forecast the demand when the number of construction permits given is 30 ; 45 ; 50. **(12 Marks)**

OR

4 a. Explain with suitable examples, the approaches used for qualitative forecasting. **(08 Marks)**

b. The manager of a large manufacturer of industrial pumps must choose between two alternative forecasting techniques. Both techniques have been used to prepare forecasts for a six months period. Using MAD and MAPD as criteria, which technique has the better performance record? Compute also the tracking signal for both the forecasting techniques and offer your comments.

Month	Demand (units)	Forecast (units)	
		Technique – 1	Technique – 2
1	492	488	492
2	470	484	482
3	485	480	478
4	493	490	488
5	498	497	492
6	492	493	493

(12 Marks)

Module-3

5 a. Explain the following terms with example :

i) Design capacity

ii) System capacity. **(04 Marks)**

b. Describe the factors that determine effective capacity. **(06 Marks)**

c. An auto component manufacturer has plan of buying hydraulic forging machines that can produce 170,000 good parts/year. These machines will be a part of a product line. The system efficiency of the product line is 85%.

i) What is the required system capacity?

ii) Assume that it takes 100 seconds to forge each part and the plant operates 2000 hours/year. If the machines will be utilized only 60% of the time and are 90% efficient, what is the actual output of machines/hour?

iii) How many forging machines would be required? **(10 Marks)**

OR

6 a. With neat sketches, explain :

i) Product layout

ii) Fixed position layout. **(06 Marks)**

b. List the factors affecting location decisions. **(04 Marks)**

c. Potential locations A, B and C have the cost structure shown in the table for a product expected to sell at Rs. 130.

Potential location	Fixed cost per year Rs.	Variable cost/unit Rs.
A	150,000	75
B	200,000	50
C	400,000	25

i) Find the most economic location for an expected volume of output of 6000 units/year

ii) What is the expected profit, if the selected site is used?

iii) For what output range each location is suitable? **(10 Marks)**

Module-4

7 a. With suitable sketches, explain :
i) Level production strategy
ii) Chase strategy of aggregate planning. **(06 Marks)**

b. A company would like to prepare an aggregate plan for the next four periods. Given the following information, set up the problem in a transportation table and solve for the minimum cost plan.

Regular time cost = Rs.20/unit

Overtime cost = Rs.25/unit

Subcontracting cost = Rs.28/unit

Inventory carrying cost = Rs.3/unit/period

Beginning inventory = 300 units.

Period	Expected demand	Regular time capacity	Overtime capacity	Subcontract capacity
1	900	1000	100	500
2	1500	1200	150	500
3	1600	1300	200	500
4	3000	1300	200	500

(14 Marks)

OR

8 a. Explain the master scheduling process (the inputs and outputs). **(08 Marks)**

b. The following information is available regarding a product :

Capacity, units/month	Cost, Rs./unit
RT = 50	RT = 20
OT = 10	OT = 26
	Inventory carrying/month = 3 , SC = Rs 29.

Develop an economic production plan for the following demand :

Month	1	2	3	4	5	6	7	8	9	10	11	12
Demand units	10	12	15	40	130	200	100	40	30	20	40	10

(12 Marks)

Module-5

9 a. With a neat block (flow) diagram, explain the inputs and outputs of a Material Requirement Planning (MRP). **(06 Marks)**

b. Use the information given in the Fig.Q9(b) (product structure tree) and determine the quantities of B, C, D, E and F needed to assemble one X.
Taking into account the on-hand inventory of various components given below determine the quantity of these components required to assemble 10 Xs.

On hand inventory :

Component	On-hand, units
B	4
C	10
D	8
E	60

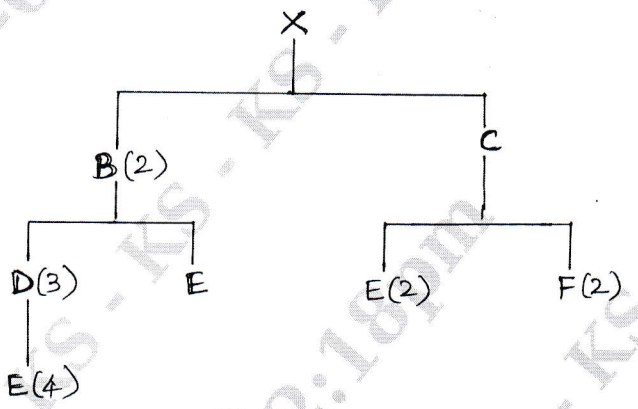

Fig.Q9(b) **(08 Marks)**

c. Complete the following MRP matrix for an item X. Determine when orders should be released? What is the on-hand inventory at the end of the last period?

Item : X Lead time : 2 weeks Lot size : minimum 50 units	Period →							
	1	2	3	4	5	6	7	8
Gross requirements	25	30	56	25	100	40	30	20
Scheduled receipts		50						
Projected on–hand 30								
Net requirements								
Planned order receipts								
Planned order releases								

(06 Marks)

OR

10 a. What is purchasing? Explain in brief the factors to be considered while selecting a supplier (or vendor) **(10 Marks)**

b. Explain why Supply Chain Management has become an import aspect for most organizations. **(10 Marks)**

* * * * *

CBCS SCHEME

18CIV59

USN | | | | | | | | | | |

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
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.

---

1. The ecology is defined as the study of
   a) Relation between organisms to their environment
   b) Relation between group of organisms to their environment
   c) Both (a) and (b)
   d) None

2. Concentration of pollutants in successive tropic levels is known as
   a) Bio-magnification b) Bio-remediation
   c) Bio-accumulation d) All of these

3. Physical environment includes
   a) Hydrosphere b) Lithosphere c) Atmosphere d) All of these

4. Word environment day is celebrated on
   a) April 22nd b) July 22nd c) June 5th d) Aug 22nd

5. Forest rich area in Karnataka is found in
   a) Bandipura b) Nagarhole c) Westernghat's d) Mangalore

6. Phytoplankton as an aquatic system can be considered as
   a) Micro consumer b) Consumer c) Producer d) Organism

7. World Food Summit (1996) is pledged to reduce the number of hungry people to
   a) 500 million b) 400 million c) 250 million d) 100 million

8. Organic farming is a farming without using
   a) Synthetic fertilizers b) Pesticides c) Green manures d) Both (a) and (b)

9. EIA is not required for projects like
a) Dams b) Highways c) Urbanization d) None of these

10. Mineral sources are
a) Renewable
b) Non-renewable
c) Equally distributed
d) None of these

11. In an eco system the flow of energy is
a) Unidirectional
b) Bidirectional
c) Cyclic
d) Multidirectional

12. Which among the following is a climatic factor
a) Light
b) Humidity
c) Temperature
d) All of these

13. Plants use which of the following gas for their photosynthesis
a) Oxygen
b) Methane
c) Nitrogen
d) Carbon dioxide

14. A Predator is
a) An animal that is fed upon
b) An animal that feeds upon another animal
c) An animal that feeds upon both plants and animals
d) A primary consumer

15. Green revolution is
a) Crop variety improvements
b) Increased use of fertilizers
c) Expansion of irrigation
d) All of these

16. Which of it is not an example of eco-system
a) Forest b) Desert c) Water d) Grassland

17. Genetic variation between distinct populations of the same species is known as
a) Specific diversity
b) Eco-system diversity
c) Genetic diversity
d) Bio-diversity

18. Which of the following is an endemic species of India
a) Asian elephant
b) Lion-Tailed macaque
c) Whales
d) Panda

19. Who introduced the concept of biodiversity hot-spot?
a) Christopher Columbus
b) Norman Myers
c) WWF
d) Charles Darwin

20. Soil erosion is prevented by
a) Deforestation
b) Afforestation
c) Over grazing
d) Removal of vegetation

21. The DODO was extinct due to
a) Pollution
b) Invasion of non-native species
c) Over exploitation of resources
d) Global environmental change

22. Which of the following is not a world heritage site
a) Manas World life sanctuary
b) Nanda Devi National park
c) Kaziranga National park
d) Periyar National park

23. EIA can be expanded as
a) Environmental and Industrial Act
b) Environmental Impact Act Activities
c) Environmental Impact Assessment
d) Environmentally important Activity

24. Where is the largest wind farm located in India?
a) Tuticorin in Tamil Nadu
b) Jaisalmar wind park Rajasthan
c) Vaspet Wind form Maharashtra
d) Chakala Wind form Maharashtra

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

26. Which country has world's largest tidal power plant
a) Netherlands b) South Korea c) Laus d) Bolivia

27. What does OTEC stands for
a) Ocean thermal energy conversion
b) Ocean thermal energy conservation
c) Ocean thermal energy cultivation
d) Ocean thermal energy consumption

28. Solar energy is as ideal energy source because of
a) Unlimited supply
b) No air and water pollution
c) No hazardous products
d) All of these

29. Why is it important to save energy in our daily lifers?
a) We need to burn more fossil fuels
b) So that other people can waste energy
c) We save electricity because it is easier to see in the dark
d) We need to protect our environment for the future

30. Wind energy generation depends on
a) Direction of wind b) Humidity
c) Velocity of wind d) All of these

31. The only disadvantage of hydrogen energy source is
a) Releases toxic products
b) Causes air and water pollution
c) Hazards effect due to risk of leakage
d) It takes more energy to produce hydrogen than the energy that could be obtained from it

32. What percent of the Sun's energy is absorbed by the earth?
a) 50% b) 0% c) 40% d) 10%

33. Bhopal gas disaster is a kind of
a) Natural disaster b) Man–made disaster
c) Water leakage d) None of these

34. Who is known as father of modern seismology
a) Charles Richter b) R.D. Oldham c) W.M. Davis d) None of these

35. Volcanic erupted material when inside the hill or earth or mountain is called
a) Lava b) Magma c) Lahars d) None of these

36. Generally the number on Richter scale ranges
a) 0 to 9 b) 1 to 5 c) 1 to 12 d) 0 to 6

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

38. In India national institute of disaster management is located at
a) Manipur b) Punjab c) Delhi d) Hyderabad

39. A disease that become usually wide-spread and even global in its reach is referred to as
a) Pandemic b) Epidemic c) Spanish flue d) Hyper endemic

40. Goal of the cloud seeding is to
a) Enhance precipitation b) Suppress hail
c) Dissipate fog d) All of these

41. The scientist who experimented cloud seeding first time
a) Isaac Newton b) Rutherford c) Vincent. J. d) C.V. Raman

42. Carbon trading deals
a) Carbon emissions b) Sulphur dioxide emissions
c) Acid rain d) None of these

43. Chemicals used for cloud seeding is
a) Dry ice b) Silver dioxide
c) Potassium dioxide d) All of these

44. One can reduce carbon foot print at lunch by
a) Don't eat food
b) Eat fast food
c) Eat lots of packaged things like lunchables
d) Buying food grown by locally and organically

45. The sources of hydrogen are
a) Biomass b) Coal c) Water d) All of these

46. Which of the following is a secondary air pollutant?
a) Carbon monoxide b) Ozone c) Sulphur dioxide d) Carbon dioxide

47. SMOG is
a) Natural phenomenon b) Colourless
c) Combination of smokes and fog d) All of these

48. Air pollution from automobiles can be controlled by fitting
a) Catalytic converter b) Wet scrubber
c) Electrostatic precipitator d) All of these

49. The sound intensity is measured in
a) dB b) NB c) Horse power d) MB

50. Noise is
a) Loud sound b) Unwanted sound
c) Constant sound d) Sound of high frequency

51. Which of the following is a nonpoint source of water pollution
a) Factories b) Sewage treatment plants
c) Urban and suburban lands d) All of these

52. Which of the following is not a marine pollutant?
a) Oil b) Plastics
c) Dissolved oxygen d) All of these

53. BOD is
a) Biochemical oxygen demand
b) A measure of the organic matter present in waste water
c) Usually less than COD
d) All of these

54. What is the first step in primary treatment plants?
a) Fine screening b) Course screening
c) Aeration d) Chlorination

55. Environmental pollution is due to
a) Rapid urbanization b) Deforestation
c) Afforestation d) Both (a) and (b)

56. Which of the following industry generates colored wastes?
a) Software industry b) Bio-medical industry
c) Textile industry d) none of these

57. Pesticide causes
a) Eye irritation b) Skin irritation c) Respiratory ailments d) All of these

58. Illegal dumping is the disposal of
a) Solid waste in non permitted area
b) Hazardous waste in non permitted area
c) Solid and hazardous waste in non permitted area
d) None of these

59. Which of the following is a biological method of disposal of muncipal solid waste
a) Composting b) Stredding c) Landfills d) Pulverization

60. The waste products in cotton mills are
a) Muncipal solid waste b) Hazardous waste
c) Non bio degradable waste d) Non hazardous waste

61. Cytotoxic and expired drugs are disposed off by
a) Dumping b) Auto clave c) Incineration d) Chemical disinfection

62. The color code of plastic bags for disposing of microbial laboratory culture waste is
a) Black b) Red c) Blue d) White

63. Which vaccination should be given to workers who deal with biomedical waste
a) Hbs Ag b) Tetanus c) Rabis d) Both (a) and (b)

64. Which of the following is the hazardous pollutant released from batteries
a) Cadmium b) Barium c) Cobalt d) Arsenic

65. Which country produces the most e-waste per year?
a) India b) China c) France d) USA

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

67. Acid rain is caused by emissions of
a) Sulphur dioxide b) Nitrogen oxide c) Both (a) and (b) d) Carbon dioxide

68. Sulphur dioxide is produced by
a) Lightning strikes b) Volcanic eruptions
c) Gasoline engine d) All are correct

69. The international protocol to project the ozone layer is
a) The Montreal protocol b) Vienna protocol
c) Kyoto protocol d) Cartgena protocol

70. Ozone layer thickness measured in
a) Millimeter b) Centimeters c) Decibels d) Dobson units

71. People who are exposed to radon in drinking water may have risk of setting
a) Typhoid b) Cholera c) Cancer d) Blue baby syndrome

72. The radon concentrations in soil samples is measured by using
a) IR-Spectroscopy b) γ-Spectroscopy c) uv-Spectroscopy d) All of these

73. Maximum permeable concentration of fluoride in drinking water is
a) 1.5 mg/L b) 1.25 mg/L c) 1.0 mg/L d) 2.0 mg/L

74. Dental fluorosis can begin at levels over
a) 1.7 ppm b) 4 ppm c) 8 ppm d) 2 ppm

75. Excess fluoride in drinking water causes
a) Blue babies b) Fluorosis c) Taste and odour d) Intestinal irritation

76. Major source of fluoride is
a) River water b) Tooth paste c) Ground water d) Food products

77. The Kyoto protocol is
a) The response to treat the climate change
b) To reduce the emission of green house gases
c) a and b
d) To give permission to emit green house gases

78. The primary source of green house gases is
a) Wind b) Fossil fuel c) Water d) Green plants

79. The Kyoto protocol was adopted at the
a) Third conference of UNFCC in 1997
b) Convention on the transboundary effects of industrial accidents
c) United nations frame work convention on climate change in 1992
d) Convention on biological diversity

80. Ecotoxicology is the study of
a) Chemical interaction of organism and environment
b) Physical interaction of organism and environment
c) Thermal interaction of organism and environment
d) Biological interaction of organism and environment

81. Hazard estimation in eco-toxicology is done based on
a) Accumulation
b) Bio-accumulation
c) SARA
d) HWL

82. Eco-toxicology is based on
a) Physical characteristics of chemicals
b) Biological characteristics of chemicals
c) Toxicological characteristics of chemicals
d) All are correct

83. Green house effect causes
a) Rise in temperature of the earth
b) Increase in rain fall
c) Lowering in acid rain
d) Lowering in temperature of the earth

84. The effects of acid rain is
a) Skin cancer
b) Reduces soil fertility
c) Increases atmospheric temperature
d) Causing respiratory problem

85. Global worming could affect
a) Climate
b) Increase in sea level
c) Melting of glaciers
d) All of these

86. Ground water is recharged naturally by
a) Rain
b) Snow melt
c) Rivers and lakes
d) All of these

87. Major compound responsible for the destruction of the stratospheric ozone layer is
a) Oxygen b) CFC c) Methane d) Carbon dioxide

88. Remote sensor detects
a) Electro magnetic radiation
b) Only IR radiations
c) Only uv radiations
d) Only visible radiations

89. Indian remote sensing satellite Cartosat has been launched to monitor
a) Spot images
b) Cartographic applications
c) Both (a) and (b)
d) Atmospheric

90. Remote sensing is a
a) Sensor system
b) Satellite system
c) Ground segment
d) All of these

91. GIS stands for
a) Generic information system
b) Geological information system
c) Geographic information Sharing
d) Geographic Information system

92. GIS does not monitor
a) Deforestation
b) Ozone layer depletion
c) Land covers
d) None of these

93. GIS mainly deals with
a) Satellite images
b) Land sat images
c) Both (a) and (b)
d) None of these

94. What is the full form of NGO's?
a) Non Governmental Organization
b) Null Governmental Organization
c) Nice Governmental Organization
d) None of these

95. What is the role of NGOs in natural resource management?
a) Creating awareness among the public on current environmental issues and solution
b) Being involved in the protection of human rights to a clean environment
c) Data generation on natural resources timeline and history
d) Making profit from government

96. The instrument which records earth quake wave is called
a) Sesimograph
b) Chimograph
c) Hythergraph
d) None of these

97. In which year the current revision of ISO 14001 get published
a) 2010
b) 2011
c) 2015
d) 2016

98. Which of the following pair of ISO 14000 standards fall under the category of environmental management system?
a) ISO 14001 and ISO 014004
b) ISO 14010 and ISO14001
c) ISO 14011 and ISO 14001
d) ISO 14011 and ISO 14004

99. Centre for science and environment is
a) Government organization
b) International body
c) Non government organization
d) None of these

100 Which of the following is NGO?
a) Narmada Bachao Andolan
b) CPCB
c) KSPCB
d) None of these

* * * * *