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18ME51

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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.

Module-1

1	a.	What is management and illustrate the roles of manager in an organization?	(08 Marks)
	b.	Summarize the levels of management.	(06 Marks)
	c.	Differentiate between management and administration.	(06 Marks)

OR

2	a.	Discuss the importance and purpose of planning.	(06 Marks)
	b.	Elaborate the steps involved in planning.	(10 Marks)
	c.	Mention the different types of plans.	(04 Marks)

Module-2

3	a.	What is organization and mention the principles of organization?	(06 Marks)
	b.	Enumerate the process of recruitment and selection process.	(08 Marks)
	c.	List the different types of organization and discuss briefly anyone of the organization structure.	(06 Marks)

OR

4	a.	Narrate the Maslow's hierarchy of needs and McGregor's theory of x and y.	(08 Marks)
	b.	Differentiate centralization and decentralization.	(06 Marks)
	c.	Elaborately discuss the steps involved in controlling process.	(06 Marks)

Module-3

5	a.	Differentiate between : i) Intuition and analysis ii) Tactics and strategy.	(06 Marks)
	b.	Explain the scientific approach of problem solving and decision making.	(08 Marks)
	c.	Explain the law of demand and supply with suitable example.	(06 Marks)

OR

6	a.	Define the law of returns and explain the three phases of Law of return.	(08 Marks)
	b.	Explain how cash flow diagram is helpful to the decision maker and draw CFD from borrowers and lenders point of view.	(06 Marks)
	c.	Find the effective interest rate if the rate of interest is 6%. When compounded : i) Yearly ii) Biannually iii) Quarterly iv) monthly.	(06 Marks)

Module-4

7 a. Illustrate the following :
   i) Ownership life or service life
   ii) Accounting life
   iii) Economic life. **(06 Marks)**

b. State and explain the condition for worth comparison method. **(06 Marks)**

c. Two holiday cottages are under considerations compare the present worth of the cost of 24 years service, at an interest rate if 5 percent, when neither cottage has a realize salvage value.

Particulars	Cottage – 1	Cottage – 2
First cost (Rs.)	4,500	10,000
Estimated life (years)	12	24
Annual maintenance cost (Rs.)	1000	720

(08 Marks)

OR

8 a. Illustrate briefly rate of return, IRR, ERR and MARR. **(08 Marks)**

b. Explain the pay back comparison method. **(04 Marks)**

c. Following are the estimates of three alternative investments made on 3 different machines in an industry. Find out which machine has the fastest payback period.

	Particular	Machine A	Machine B	Machine C
1	Initial investment (Rs.)	30,000	38,000	42,000
2	Annual reception (Rs.)	20,000	23,500	26,000
3	Annual expenditure (Rs.)	5,500	6,500	7,000
4	Economic life	4 years	4 years	4 years

(08 Marks)

Module-5

9 a. Explain how selling price is fixed for a job, giving all the components of cost, with suitable example. **(12 Marks)**

b. MICO factory produces 500 spark plugs a day involving direct material costs of Rs.40,000 direct labour cost of Rs.35,000 and factory overheads of Rs.10,000. Assuming a profit of 15% of the selling price and selling overheads to be 30% of the factory cost, calculate the selling price of one spark plug. **(08 Marks)**

OR

10 a. What is deprivation? List the different methods of determining depreciation. **(04 Marks)**

b. Explain the causes of depreciation. **(10 Marks)**

c. A student has bought moped whose first cost is Rs. 10,000 with an estimated life of 8 years. The estimated salvage value of the moped at the end of its lifetime is Rs. 2,000. Determine the depreciation amount and book value at the end of various years using SYD method of depreciation. Also find the book at the end of 10^{th} year as a specific period. **(06 Marks)**

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18ME52

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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.

Module-1

1 a. With flow diagram, explain the phases of design. **(05 Marks)**

b. Explain the following :
(i) Bi-axial stress system.
(ii) Tri-axial stress system.
(iii) Principal stresses and Principal plane. **(05 Marks)**

c. At a point in a stressed body, the stresses act are shown in Fig. Q1 (c). Determine the value of
(i) Normal and tangential stress on a plane inclined at 45° with vertical.
(ii) The principal stresses.
(iii) The orientation of principal stresses.
(iv) The max. shear stress and its direction.

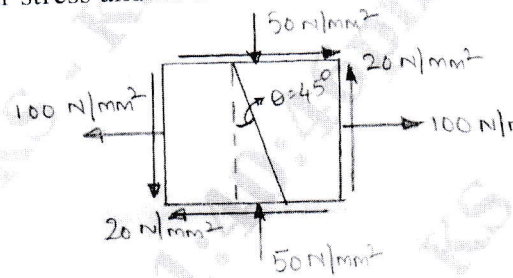

Fig. Q1 (c) **(10 Marks)**

OR

2 a. State and explain following theories of failure :
(i) Max.normal stress theory.
(ii) Max.shear stress theory.
(iii) Distortion energy theory. **(10 Marks)**

b. Find the thickness of a flat bar as shown in Fig.Q2 (b) subjected to axial load of 40 kN. Material has yield stress of 200 MPa. Assume FoS = 2.5.

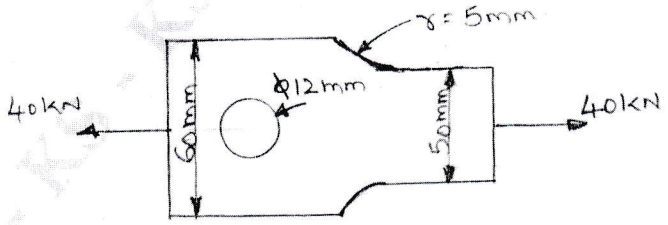

Fig. Q2 (b) **(10 Marks)**

Module-2

3 a. Derive an expression for impact stress induced in a member subjected to axial load. **(10 Marks)**

b. A 5 kg block is dropped from a height of 200 mm onto a beam shown in Fig. Q3 (b). The material has an allowable yield stress of 50 MPa. Determine the dimensions of rectangle section whose depth is 1.5 times the width. Take E = 70 MPa.

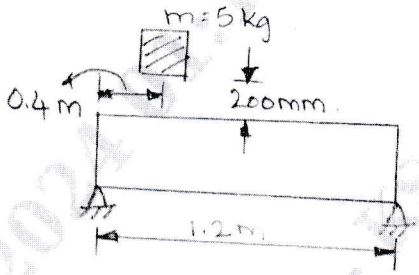

Fig. Q3 (b) **(10 Marks)**

OR

4 a. Derive Soderberg equation for designing members subjected to fatigue loading. **(06 Marks)**

b. Determine the max. load for a simply supported beam cyclically loaded as shown in Fig. Q4 (b). The beam material has ultimate strength $\sigma_u = 700$ MPa, yield strength $\sigma_y = 520$ MPa and fatigue strength in reversed bending $\sigma_{-1} = 320$ MPa. Use FoS = 1.25. The load, size and surface correction factors are 1, 0.75 and 0.9 respectively.

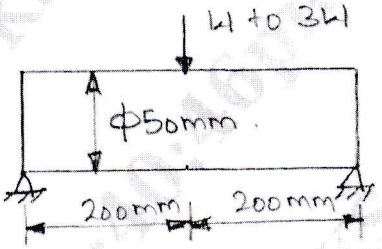

Fig. Q4 (b) **(14 Marks)**

Module-3

5 A shaft is supported by two bearing placed 1100 mm a part. A pulley of diameter 620 mm is keyed at 400 mm to the right from the left hand bearing and this drives a pulley directly below it with a max. tension of 2.75 kN. Another pulley of diameter 400 mm is placed 200 mm to the left of right hand bearing and is driven with a motor placed horizontally to the right. The angle of contact of the pulleys is 180° and $\mu = 0.3$. Find the diameter of the shaft. Assume $C_m = 3.0$, $C_t = 2.5$, $\sigma_y = 190$ MPa and $\sigma_{ut} = 300$ MPa. **(20 Marks)**

OR

6 a. Find the dimensions of the steel tapered key to transmit 20 kW at 1800 rpm. Allowable shear and compressive stresses are 80 MPa and 170 MPa respectively. Also calculate the axial force required to drive the key. **(10 Marks)**

b. Design a flange coupling to connect a shaft to a motor with following specifications. Take pump output 3000 litres/min, total head 20 m, pump speed = 600 rpm, $\eta = 70\%$. Select C-40 steel (Allowable shear stress = 82.15 MPa) for shaft, C-35 for key (Allowable shear stress = 76 MPa). Assume allowable shear stress in cast iron flange is 15 MPa. **(10 Marks)**

Module-4

7 a. With a neat sketch, Caulking and Fullering. **(10 Marks)**

b. An eccentrically loaded weld is as shown in Fig. Q7 (b). Determine the size of the weld required.

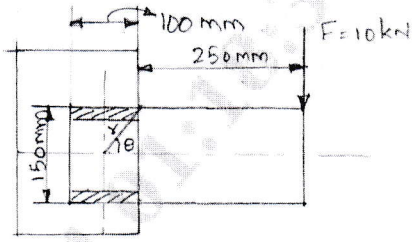

Fig.Q7 (b) **(10 Marks)**

OR

8 a. Design a double riveted-double row chain riveting with equal width cover plates, with butt joint with 2 cover plates for the longitudinal seam of a boiler shell, 1.5 m diameter subjected to a steam pressure of 0.95 N/mm^2. Assume required efficiency of 75%, take allowable tensile stress in plate as 90 N/mm^2, allowable compressive stress is 140 N/mm^2, allowable shear stress is 56 N/mm^2. **(10 Marks)**

b. A bracket supporting load P is welded to a plate by a four fillet welds of size 6 mm. What is the max. load that may be carried by the joint shown in Fig. Q8 (b) if the stress in the joint is 96 MPa.

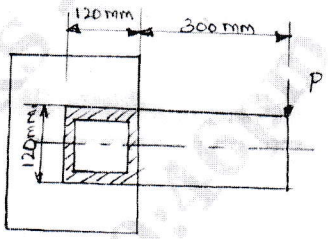

Fig. Q8 (b) **(10 Marks)**

Module-5

9 a. Design a socket and spigot cotter joint to connect two rods subjected to a tensile load of 120 kN, the permissible stresses for joint may be taken as 100 MPa in tension, 60 MPa in shear and 120 MPa in crushing. **(10 Marks)**

b. Derive an expression for torque required to raise the load for square threaded screw with usual notations. **(10 Marks)**

OR

10 a. Design a knuckle joint for a tie rod of circular cross section to sustain a max. pull of 70 kN, the ultimate tensile strength of a rod is 450 MPa, the ultimate crushing and shear strength of the pin material is 510 MPa and 396 MPa respectively. Take FoS = 6. **(10 Marks)**

b. A weight of 250 kN is raised at a speed of 6 m/min by two screw rods with square threads of 50×8 mm cut on them. Determine

(i) Torque required to raise the load.
(ii) Speed of rotation of screw rod assuming the threads of double start.
(iii) Max. stress induced on the cross section of the screw rod.
(iv) Efficiency of screw drive.
(v) Length of the nut for the purpose of supporting the load.
(vi) Check for overhaul. Take allowable bending pressure in nut and screw is $\sigma_b' = 15$ MPa. **(10 Marks)**

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18ME53

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. State the conditions for static equilibrium of a body subjected to :
(i) Two forces (ii) Three forces **(06 Marks)**

b. A four bar mechanism shown in Fig.Q1(b) has crank 2 driven by an input torque T_2 ; an external load P = 50 N acting at point E on link 3. For the position shown in figure, find the magnitude and direction of torque T_2 for the linkage to be in static equilibrium.

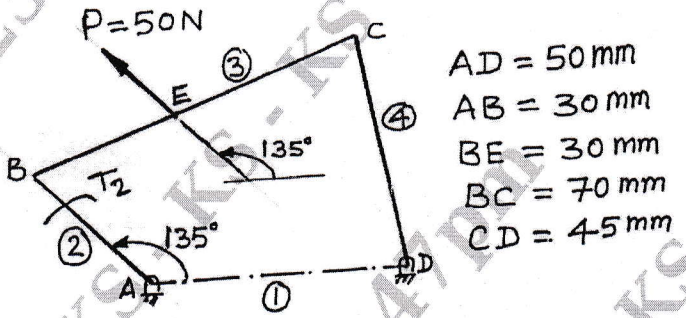

Fig.Q1(b) **(14 Marks)**

OR

2 a. State and explain D'Alembert's principle. **(05 Marks)**

b. When the crank is 50° from the inner dead centre on the down stroke, the effective steam pressure on the piston of a vertical steam engine is 2.5 bar. The diameter of the cylinder = 0.80 m, stroke of the piston = 0.5 m and length of the connecting rod = 1 meter. Determine the torque on the crank shaft, if the engine rotates at 350 rpm and the inertia of reciprocating parts 250 kg. **(15 Marks)**

Module-2

3 a. Explain static and dynamic balancing of rotating masses. **(06 Marks)**

b. Four masses A, B, C and D carried on a rotating shaft are at radii 100 mm, 140 mm, 210 mm and 160 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the masses of B, C and D are 16 kg, 10 kg, and 8 kg respectively. Find the required mass A and the relative angular positions of the four masses for the complete balancing of the shaft. **(14 Marks)**

OR

4 In a three cylinder engine, cranks are spaced at an equal angular interval of 120°. Length of connecting rod is 550 mm and the stroke length is 280 mm. The distance between centre line axis of the cylinders is 400 mm. Mass of reciprocating parts of each cylinder is 60 kg and the speed of the engine is 600 rpm. Find the primary and secondary unbalanced forces and couples acting on the reciprocating parts. **(20 Marks)**

Module-3

5 a. Define: (i) Height of governor (ii) Sensitivity of a governor (iii) Effort of a governor **(06 Marks)**

b. The upper arms of a porter governor are pivoted on the axis of rotation, their lengths being 300 mm. The lower arms are 270 mm long and are pivoted on the sleeve at a distance of 30 mm from the axis. Mass of each ball is 6 kg and sleeve mass is 50 kg. Determine the equilibrium speed for a radius of rotation of 170 mm and also the effort and power for one percent change of speed. **(14 Marks)**

OR

6 a. With usual notations, derive an expression for magnitude of Gyroscopic couple. **(08 Marks)**

b. The moment of inertia of an aeroplane air screw is 20 kg-m^2 and its speed of rotation is 1250 rpm clockwise as viewed from the nose. The speed of flight is 200 km/hour. Calculate the gyroscopic couple and discuss the direction and effect of gyroscopic couple on the aeroplane when it takes left turn on a 150 m path radius. **(12 Marks)**

Module-4

7 a. Briefly discuss/explain the following: (i) Simple Harmonic Motion (ii) Degrees of freedom (iii) Logarithmic decrement **(06 Marks)**

b. The mass 'm' is hanging from a chord attached to the circular homogeneous disc of mass 'M' and radius 'R' as shown in Fig.Q7(b). The disc is restrained from rotating by a spring attached at radius 'r' from the centre of the disc. If the mass is displaced downwards from the rest position, determine the frequency of oscillations. Take spring stiffness as 'k'. Use energy method.

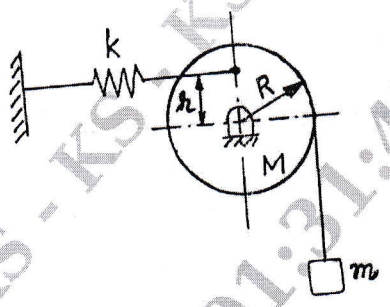

Fig.Q7(b) **(14 Marks)**

OR

8 a. Define: (i) Damping factor (ii) Damping ratio (iii) Critically damped system. **(06 Marks)**

b. In a single degree damped vibrating system, a suspended mass of 8 kg makes 30 oscillations in 18 seconds. The amplitude decreases to 0.25 of the initial value after 5 oscillations. Determine: (i) The stiffness of the spring (ii) Logarithmic decrement (iii) Damping factor (iv) The damping coefficient **(14 Marks)**

Module-5

9 a. Write a brief note on vibration isolation. **(05 Marks)**

b. A machine of total mass 17 kg is mounted on springs having stiffness k = 11000 N/cm. A piston within the machine has a mass of 2 kg which was reciprocating machine with stroke of 75 mm and speed 6000 rpm. Assuming the motion to be Simple Harmonic Motion. Determine: (i) Amplitude of machine (ii) Transmissibility (iii) Force transmitted to the ground or foundation. Take damping factor $\xi = 0.2$. **(15 Marks)**

OR

10 a. Define transmissibility. **(05 Marks)**

b. A shaft of 50 mm diameter and 3m long is supported at the ends and carries three weights of 1000 N, 1500 N and 750 N at 1m, 2m and 2.5 m from the left support, respectively. Take E = 200 GPa and find the frequency of transverse vibration of the shaft. **(15 Marks)**

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18ME54

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Turbomachines

Time: 3 hrs. Max. Marks: 100

Note: 1. ***Answer any FIVE full questions, choosing ONE full question from each module.***
2. ***Thermodynamic data Handbooks are allowed.***

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 a turbomachine. List any six differences between a turbo-machine and a positive displacement machine. **(08 Marks)**

b. Indentify the following as power generating or power absorbing turbo-machines. :
i) Kaplan Turbine
ii) Centrifugal blower
iii) De-Laval turbine
iv) Axial compressor **(04 Marks)**

c. A $1/4^{th}$ scale turbine model is tested under a head of 10m. A full scale turbine is required to work under a head of 28.5m and turns at 415rpm. At what speed must the model be run if it develops 94kW and uses $0.96m^3/s$ of water at this speed? What power will be developed from the full scale turbine? Name the type of turbine. **(08 Marks)**

OR

2 a. With h-s diagram, show that reheat factor in a multi-stage turbine is greater than unity. **(08 Marks)**

b. Define :
i) Total to total efficiency
ii) Total to static efficiency for a power
Generating turbomachine with h-s diagram. **(04 Marks)**

c. A 16 stage axial flow compressor is to have a pressure ratio of 6.3 and tests have shown that a stage efficiency of 89.5% can be obtained. The intake conditions are 288K and 1 bar. Find :
i) Overall efficiency
ii) Polytropic efficiency
iii) Pre-heat factor **(08 Marks)**

Module-2

3 a. With usual notations and velocity triangles derive alternate form of Euler turbine equation and identify the components of energy transfer. **(10 Marks)**

b. Define utilization factor for a turbine. Derive an expression relating utilization factor with the degree of reaction. **(10 Marks)**

OR

4 a. A radial outward flow turbomachine has no inlet whirl. The blade speed at exit is twice that at inlet. The radial velocity is constant throughout. Taking the inlet blade angels as 45°, show that the degree of reaction $R = \frac{2+\text{Cot}\beta_2}{4}$, where β_2 = Blade angle at exit with respect to tangential direction. **(12 Marks)**

b. At a stage of an axial flow impulse turbine, the mean blade diameter is 80cm and the speed is 3000rpm. The absolute velocity of the fluid is 300m/s and is inclined at 20° to plane of wheel. If the utilization factor is 0.85 and relative velocity at rotor exit is equal to that at inlet, determine :

i) inlet and exit blade angles
ii) power output in kW for a mass flow rate of 1Kg/s
iii) Sketch the inlet and outlet velocity triangle.

(08 Marks)

Module-3

5 a. What do you mean by compounding of stream turbine? Explain with the help of a schematic diagram, the following methods of compounding

i) Velocity compounding
ii) Pressure compounding

(10 Marks)

b. In a de-Laval turbine, steam flow from a nozzle with a velocity of 1200m/s. the nozzle angle is 22°. The mean blade speed is 400m/s and inlet and outlet angle of blades are equal. The mass of steam flowing through the turbine is 0.25Kg/s. Calculate :

i) Blade angle at inlet and outlet
ii) Tangential force on blades
iii) Power developed
iv) Blade efficiency

Take blade coefficient as 0.8.

(10 Marks)

OR

6 a. Derive an expression for maximum blade efficiency of a single stage impulse turbine in terms of nozzle angles assuming identical blades and relative velocities are same at inlet and exit.

(10 Marks)

b. The following particulars refer to a Parson's reaction turbine consisting of one ring of fixed blades and one ring of moving blades. The mean diameter of the blade ring is 90cm and its speed is 300rpm. The inlet absolute velocity to the blade is 300m/s. The blade outlet angle is 20°. The stream flow rate is 7.6Kg/s. Calculate :

i) Blade inlet angle
ii) Tangential force
iii) Power developed

(10 Marks)

Module-4

7 a. Show that for a Pelton wheel, the maximum hydraulic efficiency is given by $(\eta)_{max} = \frac{1 + k\,Cos\beta_2}{2}$. Where K = Blade velocity coefficient β_2 = Blade angle at exit.

(10 Marks)

b. A three jet Pelton wheel is required to generate 10000kW under a head of 400m. The blade angle at outlet is 15° and reduction in relative velocity over the blade (buckets) is 5%. If overall efficiency is 80%, $C_v = 0.98$ and speed ratio = 0.46.

Find : i) Diameter of jet
ii) Total flow in m^3/s
iii) Force exerted by jet on the buckets

(10 Marks)

OR

8 a. Explain the functioning of a Kaplan turbine with the help of a sectional arrangement diagram. Draw the velocity triangle of Kaplan turbine. **(10 Marks)**

b. Define the following efficiencies of a hydraulic turbine :
   i) Hydraulic efficiency
   ii) Mechanical efficiency
   iii) Overall efficiency **(06 Marks)**

c. Explain the functions of a draft tube in a reaction turbine. **(04 Marks)**

Module-5

9 a. What a primary? Why it is required? Explain how primary is achieved in centrifugal pump. **(04 Marks)**

b. With sketches, explain the principal of multi stage centrifugal pumps in i) series ii) parallel. **(08 Marks)**

c. A centrifugal pump is running at 1000rpm. The outer vane angle of the impeller is 45 and the velocity of flow at the outlet is 2.5m/s. The discharge through the pump is $0.2m^3/s$, when pump is working against a head of 20m. If the manometric efficiency is 80%, draw the outlet velocity diagram and calculate :
   i) Diameter of impeller at outlet
   ii) Width of impeller at outlet **(08 Marks)**

OR

10 a. Explain the phenomenon of surging as applied to a centrifugal compressor. **(06 Marks)**

b. What is slip and slip factor in a centrifugal compressor? Derive an expression for the same. **(06 Marks)**

c. A centrifugal compressor running at 5950rpm having an impeller tip diameter of 100cm has a mass flow rate of air as 30Kg/s. The total pressure ratio is 2.125. The pressure at the inlet is 1 bar and temperature is 0.9 and the mechanical efficiency is 97%. Find :
   i) Total efficiency
   ii) Temperature of air at exit
   iii) Power input needed
   iv) Pressure coefficient **(08 Marks)**

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18ME55

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. With a neat sketch, explain structure of hydraulic system. **(10 Marks)**

b. Define Pascal law with an example. **(04 Marks)**

c. Give some applications of hydraulic system. **(06 Marks)**

OR

2 a. Explain the desirable properties of a Hydraulic fluids. **(08 Marks)**

b. Explain the different types of seals used in hydraulic system. **(06 Marks)**

c. For a simple hydraulic jack as shown in Fig.Q.2(c) has the following data Force (F_1) = 100N, Area (A_1) = 50cm^2, Area (A_2) = 500cm^2, Stroke (S_1) = 10cm, find Stroke (S_2). Also find energy input and energy output. **(06 Marks)**

Fig.Q.2(c)

Module-2

3 a. With a neat sketch, explain unbalanced vane pump and derive the expression for volumetric displacement. **(10 Marks)**

b. Find the flow rate in ltr/sec that an axial piston pump delivers at 1000rpm. The pump has 9 no's 15mm diameter pistons arranged on a 125mm diameter piston circle. The offset angle is set at 10° and the volumetric efficiency is 94%. **(10 Marks)**

OR

4 a. Give the classification hydraulic actuators with a neat sketch, explain limited rotation hydraulic actuator. **(10 Marks)**

b. A hydraulic motor has a volumetric displacement of 8×10^{-5}m^3. If it has a pressure rating of 310 bar and it receives oil at 0.038m^3/min theoretically. Find: i) Motor speed ii) Torque iii) Power. **(10 Marks)**

Module-3

5 a. With a neat sketch, explain solenoid actuated 4/3 spool valve. Draw its symbol. **(10 Marks)**

b. With a neat sketch, explain spring loaded relief valve. **(10 Marks)**

OR

6 a. With a neat sketch, explain needle and Globe type flow control valves. **(06 Marks)**

b. With a neat circuit diagram, explain double pump hydraulic system used in punching operation. **(10 Marks)**

c. Draw the symbols for the following:
   i) Variable displacement unidirectional pump
   ii) Limited rotation motor
   iii) Cylinder with cushion
   iv) Gas loaded accumulator. **(04 Marks)**

Module-4

7 a. What are the advantages and limitations of pneumatic power system? (08 Marks)
b. With a neat sketch, explain FRL unit. (08 Marks)
c. Write a neat sketch explain single acting type pneumatic cylinder. (04 Marks)

OR

8 a. What are the different types of control values used in pneumatic system? With a neat sketch, explain quick exhaust valve. (10 Marks)
b. With a neat sketch explain static and dynamic seals used in pneumatic system. (05 Marks)
c. With a symbol explain rodless cylinder. (05 Marks)

Module-5

9 a. With a neat sketch, explain indirect actuation of pneumatic cylinder. (10 Marks)
b. With a circuit diagram, explain OR and AND gates used in pneumatic system. (10 Marks)

OR

10 a. With a circuit diagram, explain signal elimination method. (10 Marks)
b. With a circuit diagram explain pilot operated 3/2 value. (10 Marks)

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18ME56

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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 operations management. Explain briefly how the production system are classified. **(10 Marks)**

b. Define productivity. Explain briefly factors affecting productivity. **(10 Marks)**

OR

2 a. Define decision making. Briefly explain the characteristics of operation decisions. **(10 Marks)**

b. Explain break even analysis with necessary equations graphs and assumptions. **(10 Marks)**

Module-2

3 a. Define forecasting. Explain linear regression and exponential smoothing. **(10 Marks)**

b. Use the least squares method to develop a linear trend equation for the data. State the equation complete with signature and forecast a trend value for year 16.

Year	X Year coded	Y Shipments (tons)	XY	X^2
1	-5	2	-10	25
2	-4	3	-12	16
3	-3	6	-18	9
4	-2	10	-20	4
5	-1	8	-8	1
6	0	7	0	0
7	1	12	12	1
8	2	14	28	4
9	3	14	42	9
10	4	18	72	16
11	5	19	95	25
	00			

(10 Marks)

OR

4 a. Briefly explain the components of time series method with sketches. **(10 Marks)**

b. Explain the steps in the forecasting process. Briefly. **(10 Marks)**

Module-3

5 a. Explain briefly : (i) Capacity planning (ii) System capacity (iii) Design capacity (iv) Facility layout. **(10 Marks)**

b. Explain with neat sketch any two types of layout. **(10 Marks)**

OR

6 a. What are the factors influencing plant location? Explain briefly. **(10 Marks)**
b. Explain the various capacity measures. What are the capacity strategies? **(10 Marks)**

Module-4

7 a. Define aggregate planning. Explain the strategies used for aggregate planning in brief. **(10 Marks)**
b. What are the functions of Master Production Schedule? State the difference between AP and MPS. **(10 Marks)**

OR

8 a. What are the objectives of Master Production Scheduling? Explain the Master Production Schedule with a neat diagram. **(10 Marks)**
b. What are the focused aggregate planning strategies? Explain briefly. **(10 Marks)**

Module-5

9 a. Define MRP. What are the various steps involved in the implementation of MRP? **(10 Marks)**
b. Explain the key features of MRP system. List the benefits and limitation of MRP. **(10 Marks)**

OR

10 a. Explain Bull Whip effect. What are the root causes for bull whip effect? **(10 Marks)**
b. Define supply chain. Explain supply chain management with a schematic model. **(10 Marks)**

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