

CBCS SCHEME

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15ME51

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Management and Engineering Economics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define Management. Differentiate between Administration and Management. (08 Marks)
b. Explain briefly the purpose and planning. (08 Marks)

OR

- 2 a. Briefly explain, whether management is a Science (or) Art. (08 Marks)
b. Explain briefly the main steps involved in planning. (08 Marks)

Module-2

- 3 a. Explain with a neat diagram, line and staff organization. (08 Marks)
b. Briefly explain the techniques of selection. (08 Marks)

OR

- 4 a. Describe briefly the essentials of a Sound Control System. (08 Marks)
b. Briefly explain the Maslow's Hierarchy of needs. (08 Marks)

Module-3

- 5 a. Explain how Cash Flow Diagrams (CFD) are helpful to the decision maker to understand and solve Engineering Economics problems and give borrower's and lender's perspectives for cash flow diagram. (08 Marks)
b. A person is planning for his retired life. He has 10 more years of service. He would like to deposit 20% of his salary which is Rs 10,000/- at the end of the First year and there after he wishes to deposit the same amount (Rs 10,000) with an Annual increase of Rs 2000/- for the next 9 years with an interest rate of 20%. Find the total amount at the end of the 10th year of the above series. (08 Marks)

OR

- 6 a. State and explain Law of Returns. (08 Marks)
b. Determine the effective interest rate in the following cases :
i) Nominal rate of 12% compounded monthly with time interval of one year.
ii) Nominal rate of 18% compounded weekly with a time interval of one year.
iii) Nominal rate of 13% compounded monthly with a time interval of two years.
iv) Nominal rate of 9% compounded semi annually with a time interval of two years. (08 Marks)

Module-4

- 7 a. Two motorcycles of brand "A" and "B" are available on the following terms :
i) Motor cycle "A" – make a down payment of Rs 5,000/- and then Rs 6,000/- at the end of each year for 7 years.
ii) Motor cycle "B" – make a down payment of Rs 15,000/- and no payment for the next 3 years. From end of the 4th year annual payments of Rs 12,000/- for the next 3 years. Find the future worth of Motor cycle A & B. (08 Marks)

1 of 2

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.

- b. A stand by lighting generator is required for a shop. Two types are available. If both generators have a life of 4 years and the interest rate is 15% per year, which offers the lowest equivalent annual cost.

	Type - 1	Type - 2
First - Cost	Rs 5,000/-	Rs 3,200/-
Salvage value	Rs 1,000/-	- Nil -
Annual operating costs	Rs 780/-	Rs 950/-

(08 Marks)

OR

- 8 a. Compare the two investment proposals given below, if the firms MARR is 15%. Life of all the two proposals is 10 years. Compare using IRR.

Investment proposal	Initial Cost	Annual Return
Proposal 1	5,50,000/-	1,40,000/-
Proposal 2	6,25,000/-	1,60,000/-

(08 Marks)

- b. A crane can be taken on lease for a project for 3 years for Rs 1,80,000/- payable now, maintenance included. It can also be purchased for Rs 2,40,000/- and be sold at the end of 3 years for Rs 1,00,000/-. Maintenance costs are expected to be Rs 5,000/- per year for the first two years and Rs 10,000/- for the third year payable at the end of each year. At what interest rates would the two alternatives be equivalent?

(08 Marks)

Module-5

- 9 a. Briefly explain the functions of Estimating department. (08 Marks)
- b. A CNC machine costs Rs 30,00,000/- is estimated to serve for 8 years after which its salvage value is estimated to be Rs 2,50,000/- Find
- Depreciation fund at the end of the 5th year by Fixed percentage method and Declining Balance method.
 - Book value of the machine after 4th year and 6th year by Declining Balance method.

(08 Marks)

OR

- 10 a. Explain with a block diagram the elements of cost and components of cost. (08 Marks)
- b. 'Pizza corner' employed 75 workers in a particular month to work in the outlets as well as for home delivery. The following are the details of expenditure :
- Cost of material = Rs 80,000/-
 - Rate of wages for each workers = Rs 20 per hour of normal duty, Rs 40 per hour of overtime duty.
 - Man hours per day of normal duty = 8 hours.
 - Number of holidays per month (without wages) = 5 days.
 - Total overhead expenses = Rs 20,000/-.
 - Total overtime availed by workers = 200 hours.
 - Profit = 20% of total cost.
- Determine
- Total cost for the month.
 - Profit for the month.
 - Man hour rate of overheads.

(08 Marks)

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15ME52

Fifth Semester B.E. Degree Examination, Jan./Feb.2021 Dynamics of Machinery

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 A 4 bar mechanism under the action of two external forces is shown in Fig. Q1. Determine the torque to be applied on the link AB for static equilibrium. The dimensions of the links are AB = 50 mm, BC = 66 mm, CD = 55 mm, CE = 25 mm, CF = 30 mm $\angle BAD = 60^\circ$ and AD = 100 mm, CE = 25 mm. (16 Marks)

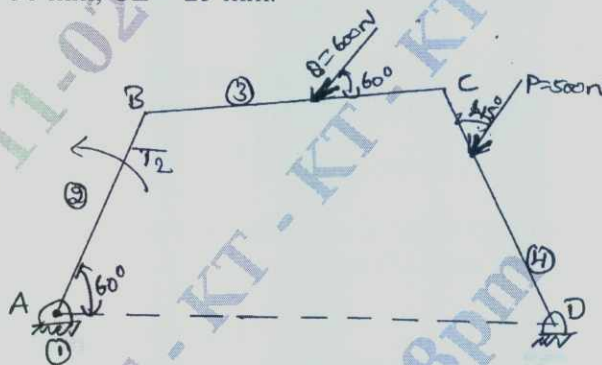


Fig. Q1

OR

- 2 The following data relate to a connecting rod of a reciprocating engine: Mass = 50 kg; Distance between bearing centres = 900 mm; Diameter of small end bearing = 70 mm; Diameter of big end bearing = 90 mm; Time of oscillation when the connecting rod is connected from small end is 1.9 seconds; Time of Oscillation when the connecting rod is connected from big end = 1.7 seconds. Determine (i) Radius of gyration of the rod is connected about an axis through centre of mass perpendicular to the plane of oscillation. (ii) Moment of Inertia of the rod about the same axis. (iii) Dynamically equivalent system of connecting rod comprising two masses one at small end bearing centre. (16 Marks)

Module-2

- 3 a. Explain static and dynamic balancing of rotating masses. (04 Marks)
b. Four masses of magnitude 5, 6, M and 8 kg revolve in planes A, B, C and D respectively. The planes B, C, D are placed at a distance 0.3 m, 1.2 m and 2.0 m respectively from A. The masses are at same radii of 0.3 m. Find the magnitude of M and relative angular position of all masses for compute balance. (12 Marks)

OR

- 4 A four crank engine has two outer cranks set at 120° to each other and their reciprocating masses are each 400 kg. The distance between planes of rotation of adjacent cranks are 450 mm, 750 mm and 600 mm. If the engine is to be in complete primary balance, find the reciprocating mass and the relative angular position for each of the inner cranks. If the length of crank is 300 mm, length of connecting rod is 1.2 m and speed of rotation is 240 rpm. Find the maximum secondary unbalanced force. (16 Marks)

Module-3

- 5 a. Explain the following: (i) Isochronous governors (ii) Hunting (iii) Sensitiveness of governors. (06 Marks)
- b. In a spring controlled governor, the curve of controlling force is straight line. When balls are 400 mm apart, the controlling force is 1200 N and when 200 mm apart the controlling force is 450 N. At what speed will the governor run when the balls are 250 mm apart? What initial tension on the spring would be required for isochronisms and what would then be the speed? The mass of each ball is 9 kg. (10 Marks)

OR

- 6 a. Explain with neat sketch the Gyroscopic effect of an Aeroplane. (08 Marks)
- b. A four wheeled trolley car has a total mass of 3000 kg. Each axle with its two wheels and gears has a total MI of 32 kg m². Each wheel is of 450 mm radius. The centre distance between two wheels is 1.4 m. Each Axle is driven by a motor with speed ratio of 1 : 3. Each motor along with its gear has a M.I. 16 kgm² and rotates in the opposite direction to that of axle. The center of mass of the car is 1 m above the rails. Calculate the limiting speed of the car when it has to travel around a curve of 250 m radius without leaving the rails. (08 Marks)

Module-4

- 7 a. Add the following two S.H.M and check it graphically,
 $x_1 = 4 \sin \left[wt + \frac{\pi}{3} \right]$, $x_2 = -6 \cos \left[wt + \frac{2\pi}{3} \right]$. (08 Marks)
- b. Determine the natural frequency of the simple pendulum, (i) Neglecting mass of rod (ii) Considering the mass of rod. (08 Marks)

OR

- 8 Determine the natural frequency of the system as shown in Fig. Q8 (a) and Fig. Q8 (b). (16 Marks)

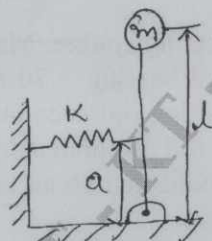


Fig. Q8 (a)

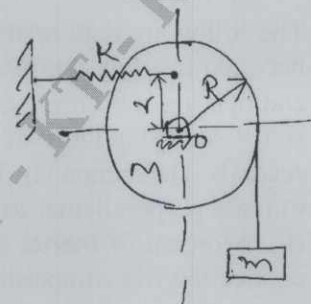


Fig. Q8 (b)

Module-5

- 9 a. Derive a governing differential equation of damped free vibration (viscous damping). (08 Marks)
- b. A mass of 7.5 kg hangs from a spring and makes damped oscillations. The time for 60 oscillations is 35 secs and the ratio of first to seventh displacement is found to be 2.5. Find (i) Stiffness of spring (ii) Damping resistance (iii) If the oscillations were critically damped what is the damping resistance. (08 Marks)

OR

- 10 a. Explain the transmissibility ratio and explain different cases with curve. (06 Marks)
- b. Determine the critical speed when an automobile trailer is traveling over a road with the road surface varies sinusoidally with a wave length of 15 meters and amplitude of 0.075 m. The springs of automobile are compressed 0.125 m under its own weight. Also determine the amplitude of vibration at 50 km/hr. (10 Marks)

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15ME53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Turbo Machines

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Distinguish between a Turbo Machine and a positive displacement machine. (06 Marks)
b. Define the specific speed of a turbine. (02 Marks)
c. A one-fifth scale model of a pump was tested in a laboratory at 1000rpm. The head developed and the power input at the best efficiency point were found to be 8m and 30kW respectively. If the prototype pump has to work against a head of 25m, determine its working speed, the power required to drive it and the ratio of the flow rates handled by the two pumps. (08 Marks)

OR

- 2 a. Define Mach number and explain with neat sketch: i) The subsonic flow ii) Sonic flow of a compressible fluid. (08 Marks)
b. An air compressor has eight stages of equal pressure ratio 1.3. The flow rate through the compressor and its overall efficiency are 45kg/s and 80% respectively. If the conditions of air at entry are 1 bar and 35°C determine: i) State of air at compressor exit ii) Polytropic efficiency iii) Stage efficiency. (08 Marks)

Module-2

- 3 a. Derive head-capacity relationship for centrifugal pump and explain the effect of discharge angle on it. (08 Marks)
b. At a 50% reaction stage axial flow turbine, the mean blade diameter is 60cm. The maximum utilization factor is 0.9, steam flow rate is 10kg/s. Calculate the inlet and outlet absolute velocities and power developed if the speed is 2000 rpm. (08 Marks)

OR

- 4 a. Show that ϵ_{\max} of an axial flow turbine with degree of reaction = 1/4, the relationship of blades speed 'U' to absolute velocity at rotor inlet 'V₁' should be $\frac{U}{V_1} = \frac{2}{3} \cos \alpha$. Where 'α' is nozzle angle at inlet. (08 Marks)
b. A single stage axial flow blower with no inlet guide vanes, operates at 3600RPM. The tip and hub diameters of the rotors are 20cm and 12.5cm respectively. The air flow through the stage is 0.45kg/s. The air turned through an angle of 20° towards the axial direction during the passage through the rotor at the mean diameter. Assuming standard atmospheric conditions, constant axial velocity and no losses in the rotor. Compare i) The power input in kW ii) Degree of reaction. (08 Marks)

Module-3

- 5 a. Define degree of reaction. Prove that moving blades and final blades should have the same shape for a 50% reaction. (08 Marks)
b. Following data refers to a De Laval steam turbine having equiangular blades;
Blade speed = 20m/s, Blade velocity co-efficient = 0.85, Mass flow rate of steam = 3kg/s, Absolute velocity of steam at exit from stage = 90m/s, Angle of absolute velocity of steam at exit from stage with tangent of wheel = 75°, Determine i) The blade angle ii) The nozzle angle iii) Absolute velocity of steam at inlet iv) Power developed. (08 Marks)

OR

- 6 a. What is compounding of steam turbine? Explain pressure compounding of steam turbine with a neat sketch. (08 Marks)
- b. In a 50% reaction turbine, the blade tips are inclined at 35° and 20° in the direction of motion. At a certain place in the turbine, the drum diameter is 1 meter and the blades are 10cm high. At this place the steam having specific volume of $0.938\text{m}^3/\text{kg}$, passes through the blades without shock. Find the mass of steam flow and power developed of the speed of the turbine is 250rpm. (08 Marks)

Module-4

- 7 a. Explain the working of Francis turbine with a neat sketch. (08 Marks)
- b. Determine the power given by the jet of water to the runner of a pelton wheel which is having tangential velocity as 20m/s. The net head on the turbine is 50m and discharge through the jet water is $0.03\text{m}^3/\text{s}$. The side clearance angle is 15° and take $C_v = 0.975$. Find also the manometric efficiency. (08 Marks)

OR

- 8 a. Derive an expression for maximum efficiency of the pelton wheel giving the relationship between the jet speed and bucket speed. (08 Marks)
- b. The external and internal diameters of an inward flow reaction turbine are 1.2m and 0.6m respectively. The head on the turbine is 22m and velocity of flow through the runner is constant and equal to 2.5m/s. The guide blade angle is given as 10° and the runner vanes are radial at inlet. If the discharge at outlet is radial determine : i) The speed of the turbine ii) The vane angle at outlet of the runner iii) Hydraulic efficiency. (08 Marks)

Module-5

- 9 a. Derive an expression for the minimum speed for starting a centrifugal pump. (08 Marks)
- b. A three stage centrifugal pump has impellers 40cm in diameter and 2cm wide at outlet. The vanes area curved back at the outlet at 45° and reduce the circumferential area by 10%. The manometric efficiency is 90% and the overall efficiency is 80%. Determine the head generated by the pump when running at 1000rpm, delivering 50 litres per second. What should be the shaft power? (08 Marks)

OR

- 10 a. With neat sketch, explain slip, slip coefficient and slip factor. (06 Marks)
- b. Explain phenomenon of surging. (02 Marks)
- c. An axial flow compressor has the following data:
 Entry conditions : 1 bar and 20°C
 Degree of reaction : 50%
 Mean blade ring diameter : 36cm
 Rotational speed : 18000rpm
 Blade angle at rotor and stator exit : 65°
 Axial velocity : 180m/s
 Mechanical efficient : 96.7%
 Find: i) Blade angle at rotor and stator inlet ii) Power required. (08 Marks)

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15ME554

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021

Non Traditional Machining

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Classify the various types of non-traditional processes based on nature of energy employed. (06 Marks)
- b. Brief the various process parameters to be considered of the selection of non-traditional processes. (06 Marks)
- c. List the various advantages and disadvantages of non-traditional processes. (04 Marks)

OR

- 2 a. Compare traditional and non-traditional processes. (06 Marks)
- b. Explain the need and characteristics of non-traditional machining. (06 Marks)
- c. List the various applications of non-traditional processes. (04 Marks)

Module-2

- 3 a. With a neat sketch, explain the working of abrasive jet machining. (06 Marks)
- b. Brief the various abrasives used in ultrasonic machining. (06 Marks)
- c. List the various advantages, disadvantages and applications of abrasive jet machining. (04 Marks)

OR

- 4 a. With a schematic diagram, explain briefly water jet machining processes. (06 Marks)
- b. List the various, applications, advantages and limitations of water jet machining. (06 Marks)
- c. Classify the various types of tool feed mechanism used in ultrasonic machining and brief the spring loaded feed mechanism with a neat sketch. (04 Marks)

Module-3

- 5 a. With a neat sketch, explain the working principle of electro chemical machining process. (06 Marks)
- b. Explain with a neat sketch the principle of electro chemical grinding. (06 Marks)
- c. Brief the electro chemical machining process characteristics. (04 Marks)

OR

- 6 a. What are the functions of an electrolyte used in ECM? Mention the properties of the electrolytes used in Electro Chemical Process (ECM). (06 Marks)
- b. Explain the chemical blanking process with a flow chart. (06 Marks)
- c. What are the advantages and disadvantages of Electro Chemical Machining? (04 Marks)

Module-4

- 7 a. Explain with a neat sketch, construction and working of electric discharge machining. (06 Marks)
- b. Name the various types of flushing and explain with the help of neat sketch any one type of flushing method used in electric discharge machining. (06 Marks)
- c. What are the various functions of dielectric fluid? Used in electric discharge machining. (04 Marks)

OR

- 8 a. With a neat sketch, explain the working of plasma arc machining. (06 Marks)
b. Classify the various types of torch used in plasma arc machining and explain with a neat sketch working of air plasma torch. (06 Marks)
c. Mention the various advantages, disadvantages and applications of plasma arc machining. (04 Marks)

Module-5

- 9 a. With a suitable sketch, explain the electron beam machining process. (06 Marks)
b. What are the process parameters of electron beam machining? (06 Marks)
c. What are the various advantages, disadvantages and applications of electron beam machining? (04 Marks)

OR

- 10 a. Explain the working of laser beam machining process with a neat sketch. (06 Marks)
b. List out the commonly used gases in laser beam machining. (06 Marks)
c. What are the advantages and disadvantages of laser beam machining. (04 Marks)
