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Code: 7G551

III B.Tech. I Semester Supplementary Examinations Jan/Feb 2022

Industrial Management

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)

UNIT-I

1. a) State and describe the Fayol's 14 principles of management. 7M
 b) Differentiate between Centralization and Decentralization 7M

OR

2. a) Explain the concept, advantages, disadvantages and applications of line and staff organization 7M
 b) Describe matrix organization. 7M

UNIT-II

3. a) Define plant layout. Explain the types of Plant layout in detail 14M

OR

4. a) Identify the critical path for the following network. Show how far the project can be crashed. also show extent of increase in normal cost with every stage of crashing.

| Activity | Preceding activity | Time (weeks) | | Cost(Rs) | |
|----------|--------------------|--------------|-------|----------|-------|
| | | Normal | Crash | Normal | Crash |
| A | - | 6 | 4 | 5000 | 6200 |
| B | - | 4 | 2 | 3000 | 3900 |
| C | A | 7 | 6 | 6500 | 6800 |
| D | A | 3 | 2 | 4000 | 4500 |
| E | B,C | 5 | 3 | 8500 | 10000 |

14M

UNIT-III

5. a) Define the concepts of 'method study' and 'work measurement' 7M
 b) Describe Cycle graph and chronocycle graph 7M

OR

6. a) Discuss about SIMO chart with its applications. 7M
 b) What is allowance? Describe the types of allowances 7M

UNIT-IV

7. a) Explain ABC inventory Control technique. 7M
 b) What are the objectives of Inventory control? Explain 7M

OR

8. a) Explain FSN inventory Control technique 7M
 b) Explain HML inventory Control technique 7M

UNIT-V

9. a) Describe job analysis 7M
 b) How do you determine the labour turnover rate? 7M

OR

10. a) Explain the need of training in an organization 7M
 b) Explain and evaluate the analytical methods of job evaluation 7M

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| R-17 |
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Code: 7G554

III B.Tech. I Semester Supplementary Examinations February 2022

Machine Tools

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

| | Marks | CO | Blooms Level |
|---|-------|-----|--------------|
| UNIT-I | | | |
| 1. a) What is meant by Orthogonal cutting and Oblique cutting? Explain with neat sketches | 7M | CO1 | L2 |
| b) Discuss the various types of chips produced during metal cutting? Explain how built-up edge on a cutting tool is undesirable | 7M | CO1 | L2 |
| OR | | | |
| 2. a) What are the various forces are acting between tool and work piece. Explain with neat sketch? | 7M | CO1 | L1 |
| b) Summaries the various types of back rake angle included in a single point cutting tool. Explain with neat sketches? | 7M | CO1 | L1 |
| UNIT-II | | | |
| 3. a) Explain the operations Turning, Facing, Chamfering with neat sketches? | 14M | CO2 | L2 |
| OR | | | |
| 4. Explain the Thread Cutting Operation with neat sketch. | 14M | CO2 | L2 |
| UNIT-III | | | |
| 5. a) Explain the basic Operations that are done on a Shaper. | 7M | CO3 | L1 |
| b) Distinguish between Shaper and Planer? | 7M | CO3 | L2 |
| OR | | | |
| 6. a) Explain up Milling and down Milling with neat sketches | 7M | CO3 | L2 |
| b) Define Indexing. Explain the following Indexing methods. (i) Direct Indexing (ii) Simple Indexing | 7M | CO3 | L2 |
| UNIT-IV | | | |
| 7. a) What is the purpose of Lapping? Explain with neat sketch | 7M | CO4 | L1 |
| b) What is honing process? Explain the methods of Honing process? | 7M | CO4 | L1 |
| OR | | | |
| 8. a) How the Grinding wheel is selected? Outline various factors that influence its selection. | 7M | CO4 | L5 |
| b) Write short notes on types of bond & designation of Grinding wheel | 7M | CO4 | L2 |
| UNIT-V | | | |
| 9. List out the various types of Clamps explain any two with neat sketch | 14M | CO5 | L1 |
| OR | | | |
| 10. Explain principles of design of Jigs and Fixtures? Write the difference between Jigs and Fixtures. | 14M | CO5 | L2 |

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Code: 7G552

III B.Tech. I Semester Supplementary Examinations February 2022

Applied Thermodynamics – II
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

| | Marks | CO | Blooms Level |
|---|-------|-----|--------------|
| UNIT-I | | | |
| 1. a) What are thermodynamic variables effecting efficiency and output of Rankine cycle. | 6M | CO2 | L1 |
| b) A steam power plant operates on a theoretical reheat cycle. Steam at boiler at 150 bar, 550°C expands through the high pressure turbine. It is reheated at the constant pressure of 40 bar to 550°C and expands through the low pressure turbine to a condenser at 0.1 bar. Draw T-S and H-S diagram. Find: i) Quality of steam at turbine exhaust. ii) Cycle efficiency iii) Steam rate in kg/kWh | 8M | CO2 | L4 |
| OR | | | |
| 2. a) Sketch and explain reheat cycle on Mollier chart | 6M | CO2 | L2 |
| b) A steam turbine is supplied with dry saturated steam at 25 bar. The exhaust takes place at 0.2 bar. For a flow rate of 8 kg/s, calculate the (i) power required to drive the pump (ii) turbine power (iii) Rankine efficiency and quality of steam at the end of expansion | 8M | CO2 | L4 |
| UNIT-II | | | |
| 3. a) What are Boiler accessories? Explain any two in detail. | 7M | CO2 | L1 |
| b) Sketch and explain the working of Lamont boiler | 7M | CO2 | L3 |
| OR | | | |
| 4. a) Give a broad classification of Boiler draught. | 6M | CO2 | L2 |
| b) A boiler is having a chimney of height 35m. The draught produced in terms of water column is 20mm. The temperature of flue gases produced inside the chimney is 365°C and that of air outside the chimney is 35°C. Determine the mass of air used. | 8M | CO2 | L4 |
| UNIT-III | | | |
| 5. a) What is steam nozzle? Why it is convergent divergent? What assumptions are adopted in analyzing flow through nozzle | 6M | CO2 | L1 |
| b) Dry saturated steam at a pressure of 8 bar enters a convergent-divergent nozzle and leaves it at a Pressure of 1.5 bar, if the flow is isentropic and the corresponding expansion index is 1.135, find the ratio of cross-sectional area at exit and throat for maximum discharge | 8M | CO2 | L4 |

OR

6. a) Define critical pressure ratio for the nozzle of the steam turbine. Obtain analytically its value in terms of the index of expansion. 6M CO2 L2
- b) Steam at 10 bar and 0.98 dry expands through a convergent divergent nozzle to a back pressure of 0.1 bar. The discharge through the nozzle is 0.55 kg/s. The enthalpy drop used for reheating the steam by friction in the divergent portion is 10% of the overall enthalpy drop. Determine (i) the throat pressure (ii) number of nozzles required if the throat area of each nozzle is 0.5 cm² (iii) exit diameter of each nozzle (iv) cone angle of divergent portion if its length is 10 cm. 8M CO2 L4

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| UNIT-IV |
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7. a) Compare the merits and demerits of surface condenser over jet Condenser. 6M CO2 L2
- b) In surface condenser the vacuum maintained is 700 mm of Hg. The barometer reads 754 mm. If the temperature of condensate is 18°C. Determine (i) mass of air per Kg of steam (ii) Vacuum Efficiency 8M CO2 L4

OR

8. a) Define the terms Vacuum efficiency and Condenser efficiency 6M CO2 L1
- b) Explain briefly the following types of jet condensers:
a) parallel-flow type b) counter flow type 8M CO2 L2

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| UNIT-V |
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9. a) Explain differences between impulse and reaction turbines. 6M CO2 L2
- b) In a reaction turbine, the blade tips are inclined at 35° and 20° in the direction of motion. The guides blades are of the same shape as the moving blades, but reversed in direction. At a certain place in the turbine, the drum diameter is 1 meter and the blades are 10cm high. At this place, the steam has a pressure of 1.75 bar and dryness 0.935. If the speed of this turbine is 250 rpm and the steam passes through the blades without shock, find the mass of steam flow and power developed in the ring of moving blades. 8M CO2 L4

OR

10. a) Explain with the help of neat sketch a single stage impulse turbine. Also explain the pressure and velocity variation along the axial direction. 6M CO2 L2
- b) In a simple impulse turbine the nozzles are inclined at 20° to the direction of motion of the moving blades. The steam leaves the nozzle at 375m/s. The blade velocity is 165m/s. Calculate suitable inlet and outlet angles for the blades in order that the axial thrust is zero. The relative velocity of steam as it flows over the blades is reduced by 15% by friction. Also determine the power developed for a flow rate of 10kg/s. 8M CO2 L4

END

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R-17

Code: 7G555

III B.Tech. I Semester Supplementary Examinations February 2022

Design of Machine Elements-I

(Mechanical Engineering)

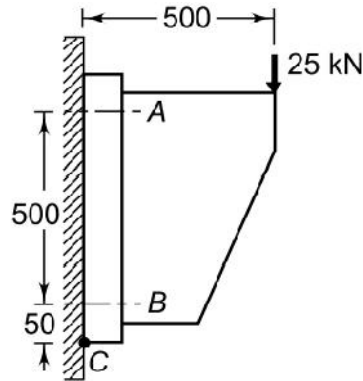
Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5 x 14 = 70Marks)

| | Marks | CO | Blooms Level |
|--|-------|-----|--------------|
| UNIT-I | | | |
| 1. a) Explain the design procedure of machine elements. | 8M | CO1 | L2 |
| b) Discuss the stress and strain relation. Draw a neat sketch of stress-strain Diagram and explain various stress points. | 6M | CO1 | L2 |
| OR | | | |
| 2. A cylindrical shaft made of steel of yield strength 700 MPa is subjected to static loads consisting of bending moment 10 kN-m and a torsional moment 30 kN-m. Determine the diameter of the shaft using two different theories of failure, and assuming a factor of safety of 2. Take E = 210 GPa and poisson's ratio = 0.25. | 14M | CO2 | L3 |
| UNIT-II | | | |
| 3. a) What are the principal causes of stress concentration? Explain with suitable sketches? | 7M | CO2 | L1,L2 |
| b) Write Soderberg's equation and state its application to different type of loadings. | 7M | CO2 | L1 |
| OR | | | |
| 4. A machine member is made of plain carbon steel of ultimate strength 650 N/mm ² and endurance limit of 300N/mm ² . The member is subjected to a fluctuating torsional moment which varies from -200 Nm to 400 Nm. Design the member using (i) modified Goodman's equation and (ii) Soderberg equation. | 14M | CO2 | L3 |
| UNIT-III | | | |
| 5. a) What are the advantages and disadvantages of welded joints over riveted joints? | 7M | CO3 | L3 |
| b) A plate 100 mm wide and 10 mm thick is to be welded to another plate by means of double parallel fillets. The plates are subjected to a static load of 80 kN. Find the length of weld if the permissible shear stress in the weld does not exceed 55 MPa. | 7M | CO3 | L2 |
| OR | | | |

6. A wall bracket is attached to the wall by means of four identical bolts, two at A and two at B, as shown in Fig. Assuming that the bracket is held against the wall and prevented from tipping about the point C by all four bolts and using an allowable tensile stress in the bolts as 35N/mm^2 , determine the size of the bolts on the basis of maximum principal stress theory.



14M CO3 L4

UNIT-IV

7. With simple sketch discuss the design procedure of Socket and spigot joint.

14M CO4 L3

OR

8. a) Design a knuckle joint to transmit 150 kN. The design stresses may be taken as 75 MPa in tension, 60 MPa in shear and 150 MPa in compression.
b) Draw neat sketches of different types of keys and state their applications.

8M CO4 L1

6M CO4 L1

UNIT-V

9. a). Explain briefly a design of shafts subjected to combined bending and torsion.
b). A shaft is required to transmit 1 MW power at 240 rpm. The shaft must not twist more than 1° on a length of 15 diameters. If the modulus of rigidity for material of the shaft is 80 GPa, find the diameter of the shaft and shear stress induced.

7M CO5 L2

7M CO5 L3

OR

10. Design a muff coupling which is used to connect two steel shafts transmitting 40 KW at 350 r.p.m. The material for the shafts and key is plain carbon steel for which allowable shear and crushing stresses may be taken as 40 MPa and 80 MPa respectively. The material for the muff is cast iron for which the allowable shear stress may be assumed as 15 MPa.

14M CO5 L3

END

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Code: 7G533

III B.Tech. I Semester Supplementary Examinations February 2022

Dynamics of Machinery
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

| | | |
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| Marks | CO | Blooms Level |
|-------|----|-----------------|

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| UNIT-I |
|---------------|

- | | | | |
|---|-----|-----|----|
| 1. a) State the laws of static friction. | 4M | CO1 | L1 |
| b) A body, resting on a rough horizontal plane required a pull of 180 N inclined at 30° to the plane just to move it. It was found that a push of 220 N inclined at 30° to the plane just moved the body. Determine the weight of the body and the coefficient of friction. | 10M | CO1 | L3 |

OR

- | | | | |
|--|----|-----|----|
| 2. a) Explain the friction circle and friction axis. | 7M | | L2 |
| b) A 150 mm diameter valve, against which a steam pressure of 2 MN/m ² is acting, is closed by means of a square threaded screw 50 mm in external diameter with 6 mm pitch. If the coefficient of friction is 0.12 ; find the torque required to turn the handle. | 7M | CO1 | L3 |

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| UNIT-II |
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|---|----|-----|----|
| 3. a) Describe the types of brakes | 6M | CO2 | L1 |
| b) A bicycle and rider of mass 100 kg are travelling at the rate of 16 km/h on a level road. A brake is applied to the rear wheel which is 0.9 m in diameter and this is the only resistance acting. How far will the bicycle travel and how many turns will it make before it comes to rest? The pressure applied on the brake is 100 N and $\mu = 0.05$. | 8M | CO2 | L3 |

OR

- | | | | |
|--|----|-----|-------|
| 4. a) Describe the construction and operation of a Prony brake dynamometer | 8M | CO2 | L1,L5 |
| b) In a laboratory experiment, the following data were recorded with rope brake: Diameter of the flywheel 1.2 m; diameter of the rope 12.5 mm; speed of the engine 200 r.p.m.; dead load on the brake 600 N; spring balance reading 150 N. Evaluate the brake power of the engine. | 6M | CO2 | L6 |

UNIT-III

5. a) State the different types of governors. 6M CO3 L1
 b) Evaluate the vertical height of a Watt governor when it rotates at 60 r.p.m. Also find the change in vertical height when its speed increases to 61 r.p.m. 8M CO3 L6

OR

6. a) Explain the turning moment diagram of a four stroke cycle internal combustion engine. 7M CO3 L2
 b) The mass of flywheel of an engine is 6.5 tonnes and the radius of gyration is 1.8 meters. It is found from the turning moment diagram that the fluctuation of energy is 56 kN-m. If the mean speed of the engine is 120 r.p.m., find the maximum and minimum speeds. 7M CO3 L3

UNIT-IV

7. Four masses m_1 , m_2 , m_3 and m_4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angles between successive masses are 45° , 75° and 135° . Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m. CO4 L3

OR

8. Describe the following:
 (a) Variation in tractive force (b) Swaying couple
 (c) Hammer blow. 14M CO4 L1

UNIT-V

9. a) Explain briefly with neat sketches the longitudinal, transverse and torsional free vibrations. 7M CO5 L2
 b) Develop an expression for free longitudinal vibrations using energy method. 7M CO5 L5
- OR**
10. Describe the Free Torsional Vibrations of a Single Rotor System and Two Rotor System 14M CO5 L1
