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**3312**

**B. Tech. 6th Semester (ME)  
Examination – May, 2025**

**MANUFACTURING TECHNOLOGY - II**

**Paper : PCC-ME-302G**

*Time : Three Hours ]*

*[ Maximum Marks : 75*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (i) Explain the purpose of cutting fluids.  $2.5 \times 6 = 15$
- (ii) Differentiate between orthogonal and oblique cutting.
- (iii) Explain the principle of Abrasive Jet Machining.
- (iv) What do you mean by Jig ? Name various types of jig.
- (v) Define MCU.
- (vi) What are advantages of Group Technology ?

3312-300-(P-3)(Q-9)(25)

P. T. O.

### UNIT - I

2. Derive the expression for shear angle in orthogonal cutting in terms of rake angle and chip-thickness ratio. 15
3. How tool life is estimated? Explain the various factors which affect tool life. What are the effects of cutting fluid on tool life? 15

### UNIT - II

4. With the help of a neat diagram, explain the working of Electron Beam Machining. What are the methods of generating electron beam? Also discuss relative merits and demerits. 15
5. How work pieces are located? What is meant by 3-2-1 principle of location? What is the best method to locate a rough surface? 15

### UNIT - III

6. Explain the classification of NC system. Also discuss the CNC and DNC systems in detail. 15
7. Explain in detail how programming is done for NC machine tool. Discuss the advantages of CNC system. 15

3312- (P-3)(Q-9)(25) (2)

### UNIT - IV

8. How classification and coding of parts is done in Group Technology layouts. Also give some benefits of using Group Technology principles in production plant. 15
9. Explain the following: 7.5 × 2 = 15
  - (a) Group Technology layout and its advantages.
  - (b) Personnel and Group Technology.

3312- (P-3)(Q-9)(25) (3)

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**3313**

**B. Tech. 6th Semester (ME)  
Examination – May, 2025**

**DESIGN OF MACHINE ELEMENT - I**

**Paper : PCC-ME-304-G**

*Time : Three Hours ]*

*[ Maximum Marks : 75*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note :* Attempt *five* questions in all, selecting at least *one* question from each Section. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (i) Fits and tolerances.  $2.5 \times 6 = 15$   
(ii) Define toughness and resilience of material.  
(iii) Draw cotter joint.  
(iv) Tension ratio in V-Belts  
(v) Explain various keys.  
(vi) Self-energizing conditions of brake.

3313-1950-(P-4)(Q-9)(25)

P. T. O.

### UNIT - I

2. (i) Explain Brain storming in design. 6 + 9 = 15  
(ii) Describe economic, societal and technical feasibility.
3. Classify engineering materials in detail and also discuss factor of safety for ductile and brittle materials. 15

### UNIT - II

4. A steam boiler is to be designed for a working pressure of  $2.5 \text{ N/mm}^2$  with its inside diameter 1.6 m. Give the design calculations for the longitudinal and circumferential joints for the following working stresses for steel plates and rivets : In tension =  $75 \text{ MPa}$ , In shear =  $60 \text{ MPa}$  ; In crushing =  $125 \text{ MPa}$ . Draw the joints to a suitable scale. 15
5. A screw jack carries a load of 22 kN. Assuming the coefficient of friction between screw and nut as 0.15, design the screw and nut. Neglect collar friction and column action. The permissible compressive and shear stresses in the screw should not exceed  $42 \text{ MPa}$  and  $28 \text{ MPa}$  respectively. The shear stress in the nut should not exceed  $21 \text{ MPa}$ . The bearing pressure on the nut is  $14 \text{ N/mm}^2$ . Also determine the effort required at the

3313- (P-4)(Q-9)(25) (2)

handle of 200 mm length in order to raise and lower the load. What will be the efficiency of screw ?

### UNIT - III

6. Describe a flat belt drive to transmit 110kW at a belt speed of 25 m/s between two pulleys of diameters 250 mm and 400 mm having a pulley centre distance of 1 metre. The allowable belt stress is  $8.5 \text{ MPa}$  and the belts are available having a thickness to width ratio of 0.1 and a material density of  $1100 \text{ kg/m}^3$ . Given that the coefficient of friction between the belt and pulleys is 0.3, determine the minimum required belt width. What would be the necessary installation force between the pulley bearings and what will be the force between the pulley bearings when the full power is transmitted ? 15
7. A multi-cylinder engine is to run at a constant load at a speed of 600 r.p.m. On drawing the crank effort diagram to a scale of  $1 \text{ m} = 250 \text{ N-m}$  and  $1 \text{ mm} = 3^\circ$ , the areas in  $\text{sq mm}$  above and below the mean torque line are as follows : 15

+ 160, -172, + 168, - 191, + 197, - 162  $\text{sq mm}$

The speed is to be kept within  $\pm 1\%$  of the mean speed of the engine. Calculate the necessary moment of

3313- (P-4)(Q-9)(25) (3)

P. T. O.

inertia of the flywheel. Determine suitable dimensions for cast iron flywheel with a rim whose breadth is twice its radial thickness. The density of cast iron is  $7250\text{kg/m}^3$ , and its working stress in tension is  $6\text{ MPa}$ . Assume that the rim contributes 92% of the flywheel effect.

#### UNIT – IV

8. Establish a formula for the frictional torque transmitted by a cone clutch. Also describe, with the help of a neat sketch, a centrifugal clutch and deduce an expression for the total frictional torque transmitted. How the shoes and springs are designed for such a clutch? 15
9. Describe with the help of a neat sketch the principle of operation of an internal expanding shoe brake. Derive the expression for the braking torque. 15

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**3314**

**B. Tech. (ME) 6th Semester  
Examination – May, 2025**

**HEAT TRANSFER**

**Paper : PCC-ME-306-G**

*Time : Three hours ]*

*[ Maximum Marks : 75*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Attempt any *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) Explain Thermal Resistance.  $2.5 \times 6 = 15$
- (b) Explain briefly the term thermal capacity and thermal diffusivity of a material.
- (c) What is Fin efficiency ?
- (d) What do you mean by fouling in a heat exchanger ?
- (e) State Wien's displacement law.
- (f) Boiling regimes.

3314-2000-(P-4)(Q-9)(25)

P. T. O.

#### UNIT - I

2. Define heat transfer and distinguish between reversible and irreversible processes in the context of thermodynamics. Discuss examples of reversible and irreversible processes in heat transfer, highlighting their implications for energy efficiency and system performance. 15
3. Calculate the rate of heat flow per m<sup>2</sup> through a furnace wall consisting of 200 mm thick inner layer of chrome brick, a centre layer of kaolin brick 100 mm thick and an outer layer of masonry brick 100 mm thick. The unit surface conductance at the inner surface is 74 W/m<sup>2</sup>°C and the outer surface temperature is 70°C. The temperature of the gases inside the furnace is 1670°C. What temperatures prevail at the inner and outer surfaces of the centre layer? Take :  $k_{\text{chrome brick}} = 1.25 \text{ W/m}^\circ\text{C}$ ;  $k_{\text{kaolin brick}} = 0.074 \text{ W/m}^\circ\text{C}$ ;  $k_{\text{masonry brick}} = 0.555 \text{ W/m}^\circ\text{C}$ . Assume steady heat flow. 15

#### UNIT - II

4. A motor body is 300 mm in diameter (outside) and 200 mm long. Its surface temperature should not exceed 50°C when dissipating 150 W. Longitudinal fins of 12 mm thickness and 30 mm height are proposed. The convection coefficient is 40W/m°C. Determine the number of fins required. Atmospheric temperature is 35°C. 15

3314-2000-(P-4)(Q-9)(25) (2)

5. A long cylindrical bar ( $k = 17.4 \text{ W/m}^\circ\text{C}$ ,  $\alpha = 0.019 \text{ m}^2/\text{h}$ ) of radius 80 mm comes out of oven at 830°C throughout and is cooled by quenching it in a large bath of 40°C coolant. The surface coefficient of heat transfer between the bar surface and the coolant is 180 W/m<sup>2</sup>°C. Determine : (i) The time taken by the shaft centre to reach 120°C. (ii) The surface temperature of the shaft when its centre temperature is 120°C. Also calculate the temperature gradient at the outside surface at the same instant of time. 15

#### UNIT - III

6. Analyze the flow of fluid over a flat plate and through a tube under forced convection conditions. Derive and discuss the momentum and energy equations governing these flows. Also highlights the differences in the flow characteristics and heat transfer mechanisms. 15
7. Derive expressions for the following cases, using definitions of irradiation and radiosity : (i) Radiation heat exchange between two black surfaces. (ii) Radiation heat exchange for three gray surfaces. (iii) Radiation heat exchange for two gray surfaces connected by single refractory surface. (iv) Radiation heat exchange for four gray surfaces. 15

3314-2000-(P-4)(Q-9)(25) (3)

P. T. O.

#### UNIT - IV

8. Steam at atmospheric pressure enters the shell of a surface condenser in which the water flows through a bundle of tubes of diameter 30 mm at the rate of 0.06 kg/s. The inlet and outlet temperatures of water are 20°C and 75°C respectively. The condition of steam takes place on the outside surface of the tube. If the overall heat transfer coefficient is 250 W/m<sup>2</sup>°C. Using the NTU method, calculate i) the effectiveness of the heat exchanger ii) the length of the tube and iii) the rate of steam condensation. 15

9. A vertical plate in the form of a Fin is 500 mm in height and is exposed to steam at atmospheric pressure. If the surface of the plate is maintained at 60°C calculate i) the film thickness at the trailing edge of the film ii) the overall heat transfer Coefficient iii) the heat transfer rate iv) the condensate mass flow rate. Assume laminar flow condition and unit width of the plate. 15

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**3315**

**B. Tech. 6th Semester (ME)  
Examination – May, 2025**

**DYNAMICS OF MACHINES**

**Paper : PCC-ME-308-G**

*Time : Three Hours ]*

*[ Maximum Marks : 75*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note : Attempt five questions in all, selecting one question from each Section. Question No. 1 is compulsory. All questions carry equal marks.*

1. Explain the following :

- (a) What is difference between break and clutch ? 5
- (b) Balancing of rotating masses. 5
- (c) Explain Prony breaks dynamometer. 5

**SECTION – A**

2. What do you understand by static and dynamic force analysis ? Explain with example. 15

3315-1900-(P-3)(Q-9)(25)

P. T. O.

3. Describe in detail the analytical and graphical method of obtaining the torque exerted in the crankshaft when weight on connecting rod is considered. 15

**SECTION - B**

4. A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anti clockwise are A to B  $45^\circ$ , B to C  $70^\circ$  and C to D  $120^\circ$ . The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions. 15
5. Derive the following expressions, for an uncoupled two-cylinder locomotive engine : 15
- (a) Variation in tractive force
  - (b) Swaying couple and
  - (c) Hammer blow

**SECTION - C**

6. (a) Explain the working of belt transmission dynamometer. 7.5
- (b) Explain rope break absorption dynamometer. 7.5

3315- (P-3)(Q-9)(25) ( 2 )

7. What do you understand by Governor ? Explain the centrifugal governor and its characteristics. 15

**SECTION - D**

8. A four wheeled trolley car has a total mass of 3000 kg. Each axle with its two wheels and gears has a total moment of inertia of  $32 \text{ kg, m}^2$ , each wheel is of 450 mm radius. The center distance between two wheels on an axle is 1.4m, each axle is driven by a motor with a speed ratio of 1 : 3. Each motor along with its gear has a moment of inertia of  $16 \text{ kg, m}^2$  and rotates in the opposite direction to that of the axle. The center of mass of the car is 1m above the rails. Calculate the limiting speed of the car when it has to travel around a curve of 250, radius without the wheels leaving the rails. 15
9. Explain the application of gyroscopic principles to aircrafts. 15

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**3316**

**B. Tech. 6th Semester (ME) (Elective-I)  
Examination – May, 2025**

**INTERNAL COMBUSTION ENGINES & GAS TURBINES**

**Paper : PEC-ME-320G**

*Time : Three Hours ]*

*[ Maximum Marks : 75*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note : Attempt five questions in all, selecting one question from each Section. Question No. 1 is compulsory. All questions carry equal marks.*

1. (i) Explain Clearance volume, swept volume and compression ratio.  $2.5 \times 6 = 15$
- (ii) Enlist the assumptions which are made for fuel-air cycle analysis.
- (iii) Why is a choke used in a carburetor ?
- (iv) What is Delay period ?
- (v) Explain the octane rating of fuels.
- (vi) How are gas turbines classified ?

3316-1700-(P-3)(Q-9)(25)

P. T. O.

#### SECTION - A

2. Discuss the difference between ideal and actual valve timing diagram of a petrol engine. 15
3. Describe a high tension magneto ignition system and compare its advantages and disadvantages with a coil ignition system. 15

#### SECTION - B

4. Explain the phenomenon of diesel knock. Compare it with the phenomenon of detonation in SI engine. 15
5. What is cooling system ? What are disadvantages of overcooling and undercooling ? Discuss the various method of cooling. 15

#### SECTION - C

6. A two stroke C.L delivers 5000 kW while using 1000 kW to overcome friction losses. It consumes 2300 kg of fuel per hour at an air-fuel ratio of 20 to 1. The heating value of fuel is 42000 kJ/kg. 15

Find the :

- (a) indicated power
- (b) mechanical efficiency
- (c) air consumption per hr
- (d) indicated thermal efficiency
- (e) brake thermal efficiency.

3316- (P-3)(Q-9)(25) (2)

7. Explain briefly various alternate fuels that can be used for I.C. Engines. 15

#### SECTION - D

8. Define slip factor and derive an expression for the same. 15
9. Explain the Brayton cycle along with its practical use and mathematical derivation. 15

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3079

**B. Tech. 4th Semester (Bio-Tech)**

**Examination – May, 2025**

**ORGANIZATIONAL BEHAVIOUR**

**Paper : HSMC-02-G**

**Time : Three Hours ]**

**[ Maximum Marks : 75**

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Answer the following questions in short :  $2.5 \times 6 = 15$ 
  - (a) Explain the function of Management.
  - (b) What are the different sources of conflict ?
  - (c) What are the different Channels of communication ?
  - (d) Explain Organizational Structure.
  - (e) Explain the Concept of Motivation.
  - (f) Differentiate between Management and Organization.

3079-6750-(P-3)(Q-9)(25)

P. T. O.

#### UNIT - I

2. What do you understand by management ? Explain the various functions of management. How the various functions of management are helpful in achievement of organizational objectives ? 15
3. Explain the difference between management and administration. Also discuss the scope and importance of Management. 15

#### UNIT - II

4. Define perception and explain the process of perception from the point of view of Organizational Behaviour. 15
5. 'Motivation is the core of management'. Comment. What suggestion would you offer to the management to motivate its staff in an industrial organization ? 15

#### UNIT - III

6. Explain the concept of team ? How is a team different from a group ? Explain the stages in group development and their implications. 15
7. Identify the leadership styles describing the situation under which each style is useful. What factors influence the choice of leadership style ? 15

3079-6750-(P-3)(Q-9)(25) (2)

#### UNIT - IV

8. What do you understand by Organizational structure? Explain the different types of Organizational structure and also discuss their effect on human behaviour. 15
9. What is Organizational Change ? Explain the types and factors affecting Organizational Change. 15

3079-6750-(P-3)(Q-9)(25) (3)