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R-17

Code: 7G554

III B.Tech. I Semester Supplementary Examinations June 2022

Machine Tools

(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) Explain importance of cutting fluids on tool life.
b) Discuss the various types of chips produced during metal machining.

- 2. a) Define the terms shear plane and shear zone
b) Explain Orthogonal cutting with a neat sketch

UNIT-II

- 3. a) Find the angle at which the compound rest should be set up to turn tapes on the work piece having a length of 300mm, Larger diameter 45 mm and smaller diameter 30mm
b) Explain principle features of single spindle automatic lathe

OR

- 4. a) Differentiate between Turret and Capstan lathes
b) Explain various operations performed on lathe

UNIT-III

- 5. Explain the working principle and types of operations to be performed on slotter.

OR

- 6. a) Describe about jig boring machine with neat sketch?
b) State and explain methods of indexing in milling machine.

UNIT-IV

- 7. a) Write short notes on
 - i. Dressing
 - ii. Truing
b) Explain static balancing of grinding wheel

OR

- 8. a) What are the advantages and limitations of using Centre less grinding?
b) Draw the typical construction of a pull broach

UNIT-V

- 9. a) Explain principles of design of jigs and fixtures
b) Compare honing and lapping.

OR

- 10. a) Explain 3-2-1 principle with an example.
b) Explain any two lapping operations

Code: 5G552

III B.Tech. I Semester Supplementary Examinations June 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)

Marks

UNIT-I

1. a) Explain the working of single plate clutch with sketch. 7M
b) A single plate clutch, with both sides effective, has outer and inner diameters 300 mm and 200 mm respectively. The maximum intensity of pressure at any point in the contact surface is not to exceed 0.1 N/mm². If the coefficient of friction is 0.3, determine the power transmitted by a clutch at a speed 2500 r.p.m 7M

OR

2. An effort of 1500 N is required to just move a certain body up an inclined plane of angle 12°, force acting parallel to the plane. If the angle of inclination is increased to 15°, then the effort required is 1720 N. Find the weight of the body and the coefficient of friction. 14M

UNIT-II

3. a) Describe the types of brakes 6M
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

OR

4. a) Describe the construction and operation of a epicyclic-train dynamometer. 8M
b) A torsion dynamometer is fitted to a propeller shaft of a marine engine. It is found that the shaft twists 2° in a length of 20 meters at 120 r.p.m. If the shaft is hollow with 400mm external diameter and 300 mm internal diameter, find the power of the engine. Take modulus of rigidity for the shaft material as 80 GPa 6M

UNIT-III

5. a) Draw the turning moment diagram of a single cylinder double acting steam engine 7M
b) A horizontal cross compound steam engine develops 300 k W at 90 r.p.m. The coefficient of fluctuation of energy as found from the turning moment diagram is to be 0.1 and the fluctuation of speed is to be kept within $\pm 0.5\%$ of the mean speed. Find the weight of the flywheel required, if the radius of gyration is 2 meters. 7M

OR

6. Explain the following: a. Sensitiveness, b. Isochronism, and c. Hunting. 14M

UNIT-IV

7. Explain The Balancing of a Single Rotating Mass By Two Masses Rotating in Different Plane. 14M

OR

8. a) A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance 14M

UNIT-V

9. A cantilever shaft 50 mm diameter and 300 mm long has a disc of mass 100 kg at its free end. The Young's modulus for the shaft material is 200 GN/m². Determine the frequency of longitudinal and transverse vibrations of the shaft. 14M

OR

10. a) Develop an expression for Natural Frequency of Free Torsional Vibrations. 7M
b) A shaft of 100 mm diameter and 1 meter long has one of its end fixed and the other end carries a disc of mass 500 kg at a radius of gyration of 450 mm. The modulus of rigidity for the shaft material is 80 GN/m². Determine the frequency of torsional vibrations. 7M
