

Code : 15ME32T

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III Semester Diploma Examination, April/May-2019

MECHANICS OF MACHINES

Time : 3 Hours]

[Max. Marks : 100

- Instructions :**
- (i) Answer any **six** questions from Part – A.
 - (ii) Answer any **seven** questions from Part – B.
 - (iii) Missing data may be suitably assumed.

PART – A

1. List the types of links. Explain any two. 5
2. Explain with a neat sketch coupling rod of a locomotive. 5
3. Explain with a neat sketch Fast and loose pulley drive. 5
4. A pulley is driven by a flat belt running at a speed of 600 m/min. The co-efficient of friction between the pulley and the belt is 0.3 and the angle of lap is 160° . If the maximum tension in the belt is 700 N; find the power transmitted by a belt. 5
5. Sketch the following pivot and collar bearings. 5
 - (i) Flat pivot
 - (ii) Conical pivot
 - (iii) Truncated pivot
 - (iv) Single flat collar
 - (v) Multiple flat collar

6. Explain the analytical method for Balancing of several masses rotating in the same plane. 5
7. Why is balancing of rotating parts necessary for high speed engines ? 5
8. Construct the displacement and velocity diagram when the follower moves with Uniform velocity. 5
9. Explain with a neat sketch 5
- (i) Transverse Vibrations
 - (ii) Torsional Vibrations

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PART – B

10. (a) Explain mechanism. 2
- (b) Explain with a neat sketch Oldham's coupling. 8
11. (a) Explain inversion of mechanism. 2
- (b) With a neat sketch explain crank and slotted lever quick return motion mechanism and state it's use. 8
12. (a) List the types of flat belt drives. 4
- (b) Two parallel shafts are to be connected by spur gearing. The approximate distance between the shafts is 600 mm. If one shaft runs at 360 rpm and the other at 120 rpm; find the number of teeth on each wheel, if the module is 8 mm. Also, determine the exact distance apart of the shafts. 6

Two pulleys, one 450 mm diameter and other 200 mm diameter are on parallel shafts 1.95 m apart and are connected by a crossed belt. Find the length of the belt required and the angle of contact between the belt and each pulley.

What power can be transmitted by the belt when the larger pulley rotates at 200 rpm, if the maximum permissible tension in the belt is 1 kN, and the co-efficient of friction between the belt and pulley is 0.25 ?

10

14. (a) State the laws of solid friction.

4

(b) A conical pivot bearing 150 mm in diameter has a cone angle of 120° . If the shaft supports an axial load of 20 kN and the co-efficient of friction is 0.03, find the power lost in friction when the shaft rotates at 200 rpm; assuming uniform pressure.

6

15. (a) Explain briefly the function of brake.

3

(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/mm^2 . If the co-efficient of friction is 0.3, determine the power transmitted by a clutch at a speed 2500 rpm.

7

16. Four masses A, B, C and D are attached to a shaft and revolve in the same plane. The masses are 12 kg, 10 kg, 18 kg and 15 kg respectively and their radii of rotations are 40 mm, 50 mm, 60 mm and 30 mm. The angular position of the masses B, C and D are 60° , 135° and 270° from the mass A.

Find the magnitude and position of the balancing mass at a radius of 100 mm.

10

17. (a) What are the different types of follower motions ?

4

(b) Classify different types of cams and explain them with a neat sketch.

6

[Turn over]

18. Construct a cam profile to raise a valve with simple harmonic motion through 50 mm in $1/3$ of revolution. Keep it fully raised through $1/12$ revolution and to lower it with simple harmonic motion in $1/6$ revolution. The valve remains closed during the rest of the revolution. The diameter of the roller is 20 mm and the minimum radius of the cam is 25 mm. The diameter of the cam shaft is 25 mm. The axis of the valve rod passes through the axis of the cam shaft.

10

19. (a) Define the following terms :

4

(i) Period of vibration or time period.

(ii) frequency

- (b) Explain in short Free or natural Vibrations, Forced Vibrations and Damped Vibrations.

6

