1620

Code : 15ME32T

Register Number

III Semester Diploma Examination, Oct./Nov.-2019

MECHANICS OF MACHINES

Time : 3 Hours] **[Max. Marks : 100**

Note : (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. Explain the following types of kinematic pairs. Give one example for each : **5**

   (i) Sliding pair

   (ii) Turning pair

2. Define kinematic chain. Name the different types of kinematic chains. **5**

3. Explain the following with respect to belt drive : **5**

   (i) Slip

   (ii) Creep

4. List any five advantages of flat belt drive over V-belt drive. **5**

5. Explain with a neat diagram the limiting angle of friction. **5**

[Turn over

6. Explain the balancing of single revolving mass by a single mass revolving in the same plane. 5

7. Define the following : 5

(i) Base circle

(ii) Pitch circle

(iii) Pressure angle

(iv) Stroke of the follower

(v) Trace point

8. Classify the follower based on : 5

(i) Surface in contact

(ii) Type of motion of the follower

9. Define : 5

(i) Free vibration

(ii) Forced vibration

PART – B

10. Explain with neat sketches the three types of constrained motions. 10

11. (a) Explain with a neat sketch the beam engine. 5

(b) With a neat sketch, explain a double slider crank chain, which is used to draw ellipses. 5

(a) Explain with a neat sketch stepped or cone pulley drive. 5

(b) Calculate the power transmitted by a belt running over a pulley of 600 mm diameter at 250 rpm. The co-efficient of friction between the belt and the pulley is 0.3, angle of lap is 150° and maximum tension in the belt is 2500 N. 5

13. (a) Draw a diagram of compound belt drive and write its velocity ratio along with their notations. 5

(b) Two parallel shafts, about 500 mm apart, are to be connected by spur gears. One shaft is to run at 300 rpm and the other at 100 rpm. Determine the sizes of the gear. 5

14. (a) Draw a neat diagram of single plate clutch. Name all the parts. 5

(b) A vertical shaft 150 mm in diameter rotating at 100 rpm, rests on a flat end footstep bearing. The shaft carries a vertical load of 20 kN. Assuming uniform pressure distribution and co-efficient of friction equal to 0.05, calculate power lost in friction. 5

15. A conical pivot bearing supports a vertical shaft of 200 mm diameter. It is subjected to a load of 30 kN. The angle of the cone is 120° and the co-efficient of friction is 0.025. Calculate the power lost in friction when the speed is 140 rpm, assuming uniform pressure. 10

16. Four masses m1, m2, m3 and m4 are 100 N, 150 N, 120 N and 130 N respectively. The corresponding radii of rotation are 0.225 m, 0.175 m, 0.25 m and 0.3 m respectively and the angles measured from m1 are 45°, 120° and 255°. Calculate the position and magnitude of the balance mass required, if its radius of rotation is 0.3 m. 10

16.

17. Construct a disc cam by using following details : 10

(i) Cam rotates in clockwise direction and is used to move a reciprocating roller with simple harmonic motion, for both outward and return stroke of the follower, in a radial path.

(ii) Out stroke with maximum displacement of 25 mm during 120° of cam rotation.

(iii) Dwell for 60° of cam rotation.

(iv) Return stroke with maximum displacement of 25 mm during 90° of cam rotation.

(v) Dwell during remaining 90° of cam rotation.

(vi) The line of reciprocation of follower passes through the cam shaft axis.

(vii) The maximum radius of cam is 30 mm.

(viii) The roller diameter is 8 mm.

18. Construct a cam operating a knife-edged follower, has the following data : 10

(i) Follower moves outwards through 40 mm during 120° of cam rotation.

(ii) Follower dwells for next 30° of cam rotation.

(iii) Follower returns to its original position during next 60° of cam rotation.

(iv) Follower dwells for the rest of the rotation.

(v) The displacement of the follower is to take place with uniform velocity motion during both the outward and return strokes. The least radius of the cam is 50 mm. Draw the profile of the cam when the axis of follower passes through the axis of the cam shaft.

19. (a) Explain briefly with neat sketches the longitudinal, transverse vibration. 5

(b) Explain the balancing of rotating parts necessary for high speed engines. 5