

Register Number:.....

B.TECH., DEGREE EXAMINATIONS MAY/JUNE 2013

Fourth Semester

TEXTILE TECHNOLOGY

MEC202: Theory of Machines

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions:-

PART A (10x1=10 Marks)

1. The motion transmitted between the lengths of gears on mesh is
 - (a) Sliding
 - (b) Rolling
 - (c) may be rolling or sliding depending upon the shape of teeth
 - (d) partly sliding and partly rolling
2. Which of the following is an inversion of double slider crank chain?
 - (a) Coupling rod of a locomotive
 - (b) pendulum pump
 - (c) elliptical trammels
 - (d) Oscillating cylinder engine
3. The size of the cam depends upon
 - (a) Base circle
 - (b) pitch circle
 - (c) prime circle
 - (d) pitch curve
4. For high speed engines, the cam follower should move with
 - (a) Uniform velocity
 - (b) simple harmonic motion
 - (c) uniform acceleration and retardation
 - (d) cycloidal motion
5. An imaginary circle which by pure rolling action gives the same motion as the actual gear is called
 - (a) Addendum circle
 - (b) dedendum circle
 - (c) pitch circle
 - (d) Clearance circle
6. The contact ratio for gears is
 - (a) zero
 - (b) less than one
 - (c) greater than one
 - (d) one
7. The train value of a gear train is
 - (a) equal to velocity ratio of gear train
 - (b) reciprocal of velocity ratio of a gear train
 - (c) always greater than unity
 - (d) always less than unity
8. A differential gear in automobile is used to
 - (a) reduce speed
 - (b) assist in changing speed
 - (c) provide jerk-free movement of vehicle
 - (d) help in turning

9. The centrifugal tension in belts
- (a) Increases power transmitted
 - (b) decreases power transmitted
 - (c) Have no effect on the power transmitted
 - (d) increases power transmitted upon a certain speed and then decreases
10. The frictional torque transmitted by a plate clutch is same as that of
- (a) flat pivot bearing
 - (b) flat collar Bearing
 - (c) conical pivot bearing
 - (d) trapezoidal pivot bearing

PART B (10 x 2 = 20 Marks)

11. State Grashoff's law.
12. Define Kinematic Chain.
13. Define the following terms in relation to cams: a) Pressure angle b) Stroke
14. Classify cams.
15. What are the advantages of the gear drives?
16. Define module of a gear.
17. Define: a) Speed ratio b) Train value
18. Differentiate simple gear train and compound gear train.
19. What are the types of belts?
20. Define slip and creep of belt drives.

PART C (5x 14 = 70 Marks)

21. a) With a neat sketch explain the indexing mechanism.

(OR)

- b) With a neat sketch explain the working of double slider crank chain mechanism.

22. a) A cam is to be designed for knife edge follower with the following data,
- a. Cam lift = 40 mm during 90° of cam rotation with the simple harmonic motion.
 - b. Dwell for the next 30° .
 - c. during the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion.
 - d. dwell during the remaining 180° .

Draw the profile of the cam when the line of stroke of the follower passes through the axis of the cam shaft. The radius of the base circle of the cam is 40 mm. determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240rpm.

(OR)

- b) A symmetrical circular cam operating a flat faced follower has the following particulars.
Minimum radius of the cam= 30mm; total lift = 20 mm; angle of lift = 75° ; nose radius = 5 mm; speed = 600rpm.

Find

- (i) The principal dimensions of the cam
 - (ii) The acceleration of the follower at the beginning of the lift at the end of contact with the circular flank, at the beginning of contact with nose and at the apex of the nose.
23. a) (i) State and prove the law of gearing. Show that involute profile satisfies the condition for correct gearing. (12)
- (ii) State the classification of gearing. (2)

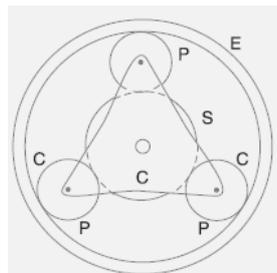
(OR)

- b) Two mating gears have 20 and 40 involute teeth of module 10 mm and 20° pressure angle. The addendum on each wheel is to be made of such a length that the line of contact on each side of the pitch point has half the maximum possible length. Determine the addendum height for each gear wheel, length of the path of contact and arc of contact.

24. a) Two parallel shafts, about 600 mm apart are to be connected by spur gears. One shaft is to run at 360 rpm and other at 120 rpm. Design the gears, if the circular pitch is to be 25mm.

(OR)

- b) An epicyclic gear train consists of a sun wheel S, a stationary internal gear E and three identical planet wheels P carried on a star – shaped planet carrier C. the size of different toothed wheels are such that the planet carrier C rotates at $1/5^{\text{th}}$ of the speed of the sunwheel S. the minimum numbers of teeth on any wheel is 16. The driving torque on the wheel is 100 N-m. Determine number of teeth on different wheels of the train and torque necessary to keep the internal gear stationary.



25. a) An open belt drive is used to connect two parallel shafts 4 m apart. The diameter of bigger pulley is 1.5 m and that of the smaller pulley 0.5m. The mass of the belt is 1 kg/m length. The maximum tension is not to be exceed 1500N. The coefficient of friction is 0.25. The bigger pulley, which is the driver, runs at 250 rpm. Due to slip, the speed of the driven pulley is 725 rpm. Calculate the power transmitted, power lost in friction and the efficiency of the drive.

(OR)

- b) A single plate clutch with both sides effective has inner and outer diameters of friction surface 250 mm and 350 mm respectively. The maximum intensity of pressure is not to exceed 0.15 MPa. The coefficient of friction is 0.3. Determine the power transmitted by the clutch at a speed of 2400 rpm for uniform wear and uniform pressure.
