Register Number: ………….

B.TECH DEGREE EXAMINATIONS: MAY 2015

(Regulation 2013)

Fourth Semester

TEXTILE TECHNOLOGY

U13MET406:Basics of Applied Mechanics and Thermal Engineering

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. In a four bar chain or quadric cycle chain
    a) Each of the four pairs is a turning pair
    b) One is a turning pair and three are sliding pairs
    c) Two are turning pairs and two are sliding pairs
    d) Three are turning pairs and one is a sliding pair

2. The Whitworth quick return motion mechanism is formed in a slider crank chain when the _____ link is fixed.

3. The maximum velocity of the particle moving with simple harmonic motion is
    a) ω
    b) ωr
    c) $\omega^2 r$
    d) ω / r

4. In involute gears, the pressure angle used is _____ degrees.

5. When the axes of the first and last wheels are co-axial, then the train is known as
    a) Simple train of wheels
    b) Compound train of wheels
    c) Reverted gear train
    d) Epicyclic gear train

6. The type of gear train usually employed in clocks is _____.

7. In a four stroke cycle petrol engine, the expansion
    a) Starts at top dead centre and ends at bottom dead centre
    b) Starts at 30° before top dead centre and ends at 50° before bottom dead centre
    c) Starts at 30° after top dead centre and ends at 50° after bottom dead centre
    d) May start and end anywhere

8. A device used in a boiler to control the flow of steam from the boiler to the main pipe and to shut off the steam completely is _____

9. One tonne of refrigeration (1TR) means that the heat removing capacity is

a) 21 KJ / min   b) 210 KJ / min

c) 420 KJ / min   d) 620 KJ / min

10. _____refrigerant has the maximum ozone depletion potential in the stratosphere.

PART B (10 x 2 = 20 Marks)
(Not more than 40 words)

11. What is meant by the degree of freedom of a mechanism?

12. Define inversion of mechanism.

13. How are the cams classified?

14. Define pressure angle.

15. What do you understand by "gear trains"?

16. What is epicyclic gear train?

17. Compare the four stroke and two stroke IC engines.

18. What is the use of boiler mountings? And list the various boiler mountings.

19. Define relative COP.

20. What is sensible heat factor (SHF)?

PART C (5 x 14 = 70 Marks)
(Not more than 400 words)

Q.No. 21 is Compulsory

21. Explain the inversion of single slider crank chain with neat sketch.

22. a) A cam is to be designed for a knife edge follower with the following data :

1. Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion.

2. Dwell for the next 30°.

3. During the next 60° of cam rotation, the follower returns to its original position with

Simple harmonic motion.

4. Dwell during the remaining 180°.

Draw the profile of the cam when

   (a) the line of stroke of the follower passes through the axis of the cam shaft, and

   (b) The line of stroke is offset 20 mm from 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 240 r.p.m.

b) Two involute gears in mesh have 20° pressure angle. The gear ratio is 3 and the number of teeth on the pinion is 24. The teeth have a module of 6 mm. The pitch line velocity is 1.5m/s and the addendum equal to one module. Determine the angle of action of the pinion (the angle turned by the pinion when one pair of teeth is in mesh) and the maximum velocity of sliding.

23. a) In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise. Direction, what will be the speed of gear B?

(OR)

b) Two shafts A and B are co-axial. A gear C (50 teeth) is rigidly mounted on shaft A. A compound gear D-E gears with C and an internal gear G. D has 20 teeth and gears with C and E has 35 teeth and gears with an internal gear G. The gear G is fixed and is concentric with the shaft axis. The compound gear D-E is mounted on a pin which projects from an arm keyed to the shaft B. Sketch the arrangement and find the number of teeth on internal gear G assuming that all gears have the same module. If the shaft A rotates at 110 r.p.m. Find the speed of shaft B.

24. a) (i) Explain the working principle of four stroke petrol engine. (7)

(ii) Explain the components of two stroke engines. (7)

(OR)

b) Draw the layout of steam power plant and explain the working cycle in it.

25. a) (i) Explain the working principle of vapour absorption system with neat sketch. (7)

(ii) Define the terms of i) Relative humidity. (7)

ii) Dew point temperature.

iii) Wet bulb temperature

(OR)

b) Write about the Year round air conditioning system with neat sketch.

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