

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2019 - 20 Examination

Semester: 5
Subject Code: 03110310
Subject Name: Theory of Machines

Date: 28-11-2019
Time: 10:30 am to 01:00 pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions (All are compulsory) (Each of one mark) (15)**(A) Fill in the blanks**

1. Centrifugal force acts towards _____ direction from Centre.
2. The range of speed of Isochronous governor is _____.
3. The mechanism forms a structure, when the number of degrees of freedom (n) is equal to _____.
4. The module is the reciprocal of _____.
5. Due to slip of the belt, the velocity ratio of the belt drive _____.

(B) Write whether the statement is TRUE or FALSE

6. Clutch is used to reduce the speed of engine.
7. Break is used to transmit the power from driving shaft to driven shaft.
8. Flywheel can be used for balancing purpose.
9. The size of gear is specified by pitch circle.
10. Vibration is the cause of unbalancing of forces.

(C) Select correct answer (MCQ)

11. Epicyclic – Train dynamometer is:
 (a) Absorption type dynamometer (b) Transmission type dynamometer
12. For two governors A and B, the lift of sleeve of governor A is more than that of governor B, for a given fractional change in speed. It indicates that
 (a) governor A is more sensitive than governor B (b) governor B is more sensitive than governor A
 (c) both governors A and B are equally sensitive (d) none of the above
13. For various position of crank, The turning moment diagram (also known as crank-effort diagram) is the graphical representation of
 (a) $T \rightarrow \theta$ (b) $\theta \rightarrow T$ (c) $N \rightarrow \theta$ (d) $\theta \rightarrow N$
14. The height of a Watt's governor (in meters) is equal to
 (a) $8.95/N^2$ (b) $89.5/N^2$ (c) $895/N^2$ (d) $8950/N^2$
15. A kinematic chain is known as mechanism when
 (a) none of the links is fixed (b) one of the links is fixed
 (c) two of the links are fixed (d) all of the links are fixed

Q.2 Answer the following questions. (Attempt any three) (15)

- (A) Explain turning moment diagram for 4 stroke single cylinder IC engine with neat sketch.
- (B) Explain the method of balancing of different masses revolving in the same plane.
- (C) A Porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and the mass of the central load on the sleeve is 25 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find the minimum and maximum speeds and range of speed of the governor.
- (D) Explain the phenomena of 'slip' and 'creep' in a belt drive.

Q.3 (A) What is a machine? Giving example, differentiate between a machine and a structure. (07)

- (B) In a pin jointed four bar mechanism, AB = 300 mm, BC = CD = 360 mm, and AD = 600 mm. (08)**
 The angle BAD = 60°. The crank AB rotates uniformly at 100 r.p.m. Locate all the instantaneous Centre and find the angular velocity of the link BC.

OR

- (B) What is the function of clutch? Differentiate between Single Plate and Multi Plate clutch. (08)**

Q.4 (A) Draw and explain Gear Tooth Terminology in detail (minimum 6 terminologies). (07)**OR**

- (A) Prove that the maximum fluctuation of energy, $\Delta E = E \times 2Cs$ (07)**

- (B) What is the function of governor? Explain working principle of centrifugal governor with neat sketch? (08)**