Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech. (AE) (2012 to 2017) (Sem.–4)

MECHANICS OF MACHINES

Subject Code : BTAE-402

M.Code : 54123

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a) Define 'higher pair' and 'lower pair'.

b) Write down Grubler's criterion for plane mechanisms.

c) Name any two lower pairs.

d) What is the function of idler pulley in belt drive?

e) List limitations of chain drive.

f) Why electric motors do not have flywheels?

g) Classify the cam follower based on the surface in contact.

h) Distinguish between the working of a flywheel and a governor.

i) Define coefficients of fluctuation of energy and speed.

j) What is the condition of isochronisms in governors? In what type of governors can it be achieved?

SECTION-B

2. Describe briefly the functions of elliptical trammel and scotch yoke with help of diagrams.

3. Derive the condition for transmitting maximum power in a flat belt drive.

4. Give classification of cams and explain the terms 'Base Circle', 'Pressure angle' and 'Prime circle' with a neat sketch.

5. A horizontal cross compound steam engine develops 300 kW at 90 rpm. The co-efficient of fluctuation of energy as found from the turning moment diagram is 0.1 and speed is to be kept within 0.5 % of the mean speed. Find the mass of the flywheel required, if the radius of gyration is 2m.

6. Explain the method of direct and reverse cranks to determine the unbalanced forces in radial engines.

SECTION-C

7. A 2.5 kW of power is transmitted by an open belt drive. The linear velocity of the belt is 2.5 m/s. The angle of lap on the smaller pulley is 165°. The coefficient of friction is 0.3. Determine the effect on power transmission in the following cases :

   a) Initial tension in the belt is increased by 8%

   b) Initial tension in the belt is decreased by 8%.

8. A C.I. flywheel is fitted to a punching press to run at 90 *r.p.m.* and must supply 12000 Nm of energy during 15^{th} revolution and allow 15% change of speed. The rim speed is limited to 350 m/min. Find the mean diameter and mass of the flywheel and motor power. Assume overall efficiency as 80%.

9. a) Briefly explain the method of finding the counter masses in two planes to balance the dynamic unbalance of rotating masses.

   b) Describe the function of a Hartnell governor with the help of a neat sketch.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.