

Code No: RT31031

**R13****SET - 1****III B. Tech I Semester Supplementary Examinations, May - 2018****DYNAMICS OF MACHINERY**

(Common to Mechanical Engineering and Automobile Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is compulsory3. Answer any **THREE** Questions from **Part-B****PART -A**

- 1 a) What is the function of Gyroscope? [4M]
- b) List the types of clutches? [4M]
- c) Define crank effort? [3M]
- d) Write about isochronism? [4M]
- e) Write about swaying couple? [4M]
- f) Explain about vibration isolation? [3M]

**PART -B**

- 2 a) An aeroplane makes a complete half circle radius towards left when flying at 210 km/h. The rotary engine and the plane is of 50 kg mass having a radius of gyration of 300 mm. The engine rotates at 2400 rpm clockwise as seen from the rear. Find the gyroscopic couple on the aircraft and its effect on the plane. [8M]
- b) Explain the working of a Gyroscope along with an example of its use and give its merits and demerits [8M]
- 3 a) A single plate clutch having both sides effective is required to transmit 45 kW at 1500 rpm. The outer diameter of the plate is limited to 300 mm and the intensity of pressure between the plates is not to exceed 0.07 MPa. Assuming uniform wear and a coefficient of friction 0.35, determine the inside diameter of the plate? [9M]
- b) Explain about boundary friction and film lubrication? [7M]
- 4 a) The torque exerted on the crank shaft of a two stroke engine is given by the equation  $T = (14,500 + 2,300 \sin 2\theta - 1,900 \cos 2\theta)$  N-m where  $\theta$  is the angle moved by the crank from I.D.C. If the resisting torque is constant find: [10M]
  - i) The power of the engine, when the speed is 150rpm.
  - ii) The moment of inertia of the flywheel if the speed variation is not to exceed  $\pm 0.5\%$  of the mean speed.
  - iii) The angular acceleration of the flywheel when the crank has turned through  $30^\circ$  from the I.D.C.
- b) Explain about coefficient of fluctuation of speed and coefficient of fluctuation of energy. [6M]

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- 5 In a spring loaded Hartnell type of governor, the mass of each ball is 4kg and the lift of the sleeve is 50mm. The governor begins to float at 240rpm, when radius of the ball path is 110mm. The mean working speed of the governor is 20 times the range of the speed when friction is neglected. The lengths of the ball and roller arms of the bell-crank lever are 120mm and 100mm respectively. The pivot centre and the axis of governor are 140mm apart. Determine the initial compression of the spring, taking in to consideration of arms. [16M]
- 6 A three cylinder radial engine driven by a common crank has the cylinders spaced at  $120^\circ$ . The stroke is 100 mm, length of the connecting rod 200 mm and the reciprocating mass per cylinder 1.5 kg. Calculate the primary and secondary forces at crank shaft speed of 1500 r.p.m. [16M]
- 7 a) Explain the phenomenon of the whirling of shafts. [6M]  
b) Derive an expression for logarithmic decrement in damped free vibration of a mechanical system? [10M]

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