

III B. Tech I Semester Supplementary Examinations, May - 2019

DYNAMICS OF MACHINERY

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

 Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**3. Answer any **FOUR** Questions from **Part-B**

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**PART - A**

1. a) How do the effects of gyroscopic couple make the rider of a two wheeler to tilt on one side? [2M]
- b) Discuss the rigid disc at an angle fixed to a rotating shaft. [2M]
- c) What is a wedge? Write its expression for its efficiency. [2M]
- d) Define the term coefficient of fluctuation of energy and coefficient of fluctuation of speed. [3M]
- e) What do you mean force balancing of linkages? [3M]
- f) Describe the critical speeds of the shaft. [2M]

**PART - B**

2. a) Explain the effect of gyroscopic effect on four wheeled vehicle. [7M]
- b) What is stability of an automobile? What is effect of gyroscopic couple? [7M]
3. a) What is meant by tractive resistance in case of wheeled vehicle? What are its main components? [7M]
- b) An internal shoe brake has a diameter of 320 mm and width of 30 mm. The cam forces are equal. Maximum pressure is not to exceed  $80 \text{ N/mm}^2$ .  $\phi_1 = 15^\circ$ ,  $\Phi_2 = 145^\circ$ ,  $a = 220 \text{ mm}$ ,  $c = 125 \text{ mm}$  and  $\mu = 0.32$ . Determine the actuating force and the brake torque. [7M]
4. a) Describe the graphical method of considering the inertia of the connecting rod of a reciprocating engine. [7M]
- b) Derive the balancing of locomotives. [7M]
5. a) Why are inertia governor quicker in action as compared to centrifugal governors? Explain? [7M]
- b) Sketch a Hartnell governor. Describe its function and deduce a relation to find the stiffness of the spring. [7M]
6. a) Describe the effects of partial balancing in locomotives? [7M]
- b) Each crank of a four cylinder vertical engine is 225 mm. The reciprocating masses of the first, second and the third cranks are 100 kg, 120 kg and 100 kg and the planes of rotation are 600 mm, 300 mm and 300 mm from the plane of rotation of the third crank. Determine the mass of the reciprocating parts of the third cylinder and the relative angular positions of the cranks if the engine is in complete primary balance. [7M]
7. a) What do you mean by whirling of shafts? What is critical speed? Explain. [7M]
- b) The rotor of turbo super charger weighing 9 kg is keyed to the centre of a 25 mm diameter steel shaft 40 cm between bearings. Determine the i) critical speed of shaft, ii) amplitude of vibration of the rotor at a speed of 3200 rpm if the eccentricity is 0.015 mm and iii) vibratory force transmitted to the bearings at this speed. [7M]

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