Q.P. Code: 16ME308 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations Dec 2019

DYNAMICS OF MACHINERY

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	**a**	Explain the effect of gyroscopic couple on an Aeroplane.	**4M**
	b	The rotor of a turbine yatch rotates at 1200 rpm clockwise when viewed from stern. The rotor has a mass of 750 kg and radius of gyration of 250 mm. Find the maximum gyroscopic couple transmitted to the hull when yacht pitches with a maximum angular velocity of 1 rad/s. What is the effect of this couple?	**8M**

OR

2	**a**	Define Co efficient of fluctuation of energy.	**2M**
	b	The torque delivered by a two stroke engine is represented by T= (1000+300 Sin2Θ- 500 Cos2Θ) N-m where Θ is the angle turned by the crank from the IDC. The engine speed is 250 rpm.The mass of the flywheel is 400kg and radius of gyration 400mm.Determine,(i) the power developed (ii) The total percentage fluctuation of speed (iii) The angular acceleration of flywheel when the crank has rotated through an angle of 60° from the IDC. (iv) The maximum angular acceleration and retardation of the flywheel.	**10M**

UNIT-II

3	**a**	How is rolling friction different from sliding friction?	**2M**
	b	A pivot flat bearing internal and external diameter as 300 and 450mm. maximum intensity pressure as 0.075 N/mm².the first disc had three plates and second disc had two disc the coefficient of frictional surface shaft and plate surfaces as 0.02 .power absorbed by disc is 5kw. Assuming uniform wear. Shaft rotating with speed of 580 rpm, then find out torque developed on the plate.	**10M**

OR

4	**a**	Describe with neat sketch the Rope Brake Dynamometer	**4M**
	b	A single disc clutch internal and external diameter as 200 and 300 mm. maximum intensity pressure as 0.06 N/mm².the coefficient of frictional surface shaft and plate surfaces as 0.03 N/mm².Determine power lost in to the shaft. Assuming uniform wear. Shaft speed rotating with speed of 1200 rpm.	**8M**

UNIT-III

5	**a**	Distinguish between a Governor and a flywheel.	**2M**
	b	The length of the upper and lower arms of a porter governor is 200mm and 250 mm respectively. Both the arms are pivoted on the axis of rotation. The central load is 150N, the weight of the each ball is 20N and the friction of the sleeve together with the resistance of the operating gear is equivalent to a force of 30N at the sleeve. If the limiting inclinations of the upper arms to the vertical are 30° and 40° taking friction in to account. Find the range of speed of the governor.	**10M**

OR

6	**a**	How the governors are classified?	**3M**
	b	A governor of Hartnell type has equal balls of mass 3kg, set initially at a radius of 200mm.The arms of the bell crank lever are 112mm vertically and 150mm horizontally. Find (i) The initial compressive force on the spring at a radius of 200mm at 240rpm and (ii) The stiffness of the spring required to permit a sleeve movement of 4mm on a fluctuation of 7.5 percent in the engine speed.	**9M**

UNIT-IV

7	**a**	Define Swaying couple?	**2M**
	b	A shaft is rotating at a uniform angular speed. Four masses M1, M2, M3 and M4 magnitudes 300kg, 450kg, 360kg, 390kg respectively are attached rigidly to the shaft. The masses are rotating in the same plane. The corresponding radii of rotation is 200mm, 150mm, 250mm and 300mm respectively. The angle made by these masses with horizontal are 0°.45°, 120°and 255°respectively. Find (i) the magnitude of balancing mass (ii) the position of balancing mass if its radius of rotation is 200mm.	**10M**

OR

8	**a**	What is Balancing of rotating masses?	**2M**
	b	A four cylinder vertical engine has cranks 300mm long. The plane of rotation of the first, third and fourth cranks are 750mm,1050mm and 1650mm respectively from that of the second crank and their reciprocating masses are 10 kg, 400 kg and 250kg respectively. Find the mass of the reciprocating parts for the second cylinder and relative angular position of the cranks in order that the engine may be in complete balance.	**10M**

UNIT-V

9	**a**	What are the types of Vibrations?	**3M**
	b	Derive an expression for the natural frequency of the free longitudinal vibration by (i) Equilibrium method (ii) Energy method (iii) Rayleigh's method.	**9M**

OR

10	**a**	Define resonance?	**2M**
	b	A vibrating system consists of a mass of 8kg, spring of stiffness 5.6N/m and dashpot of damping coefficient of 40N/m/s. Find,(i) Critical damping coefficient (ii) the damping factor (iii) the natural frequency of damped vibration (iv) the logarithmic decrement (v) the ratio of two consecutive amplitude (vi) the number of cycle after which the original amplitude is reduced to 20 percent.	**10M**

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