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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations May/June-2024

THEORY OF MACHINES

(Mechanical Engineering)

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

PART-A

(Answer all the Questions **5 x 2 = 10** Marks)

1	a	Define active gyroscopic couple and reactive gyroscopic couple.	CO1	L2	2M
	b	Write the principle of Dynamometer.	CO1	L1	2M
	c	Distinguish between a Governor and a flywheel.	CO2	L2	2M
	d	Define hammer blow.	CO1	L1	2M
	e	Explain transmissibility.	CO2	L2	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	Define coefficient of fluctuation of speed and coefficient of fluctuation of energy.(ii)The radius of gyration of a fly wheel is 1meter and fluctuation of speed is not to exceed 1%of the mean speed of the flywheel. If the mass of the flywheel is 3340kg and the steamdevelops 150KW at 135rpm, then find i).Maximum fluctuation of energy ii) Coefficient of fluctuation of energy .	CO1	L1	10M

OR

3	A horizontal single acting steam engine has a cylinder 400mm diameter and 550mm stroke and runs at 180rpm.The reciprocating parts has a mass of 225kg and the piston rod is 50mm diameter.The connecting rod is 1.2m long. When the crank has turned 125°from IDC the steam pressure above the piston is 30KN/m2.calculate,(i) Crank-pin effort (ii) The effective turning moment on the crank shaft.	CO1	L1	10M

UNIT-II

4	A cone pivot bearing had 400mm diameter. It is supported by the shaft with speed of 250 rpm. Cone angle as 120° Normal intensity pressure in to the shaft and face plate surface as 0.08 N/mm².power lost in to shaft was 4kw.determine total toque in to the plate. Consider shaft rotating with uniform wear.	CO1	L3	10M

OR

5	In a horizontsl belt transmission dynamometer the diameter of the driving pulley rotating at 1800rpm is 90mm. The centre distance of the intermediate pulleys from the fulcrum is also 70mm each. The weighing pan on the lever is at a distance as 250mm. Find the power Transmitted when a mass of 30kg is required in the pan, including its own mass.	CO2	L3	10M

UNIT-III

6	Calculate the rage of speed of a porter governor which has equal arms of each 200mm long and pivoted on the axis of rotation .The mass of each ball is 4kg and the central load of the sleeve is 20kg.The radius of rotation of the ball is 100mm when the governor being to lift and 130mm when the governor is at maximum speed.	CO2	L3	10M

OR

7	In a spring controlled governor, the controlling force curve is a straight line. When the balls are 400mm apart, the controlling force is 1200N and when 200mm apart, the controlling force is 450N.Determine the speed at which the governor runs when the balls are 250mm apart. When initial tension on the spring would be required for isochronisms and what would be the speed. Take mass of each ball to be 10kg.	**CO1**	**L3**	**10M**

UNIT-IV

8	A, B, C and D are four masses carried by a rotating shaft at radii 100mm,125mm,200mm and 150mm respectively. The planes in which the masses revolve are spaced 600mm apart and the masses of B,C and D are 10kg,5kg and 4kgrespectively.Find the required mass A and relative angular setting of the four masses so that the shaft be in complete balance.	**CO2**	**L2**	**10M**

OR

9	A three 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 10kg,400kg 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.	**CO2**	**L3**	**10M**

UNIT-V

10	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.	**CO1**	**L3**	**10M**

OR

11	The barrel of a large gun recoils against a spring on firing. At the end of the firing, a dashpot is engaged that allows the barrel to return to its original position in minimum time without oscillation. Gun barrel mass is 400kg and initial velocity of recoils 1m.Determine spring stuffiness and critical damping coefficient of dashpot.	**CO2**	**L3**	**10M**

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