Q.P. Code: 19ME0307

R19

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year II Semester Regular Examinations August-2022

THEORY OF MACHINES

(Agricultural Engineering)

Time: 3 hours | Max. Marks: 60

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

UNIT-I

1	a	List effect of gyroscopic couple on a naval ship during steering.	L4	5M
	b	The turbine rotor of a ship has a mass of 8 tonnes and a radius of gyration 0.6 m. It rotates at 1800 r.p.m. clockwise, when looking from the stern. Determine the gyroscopic couple, if the ship travels at 100 km/hr and steer to the left in a curve of 75 m radius.	L2	7M

OR

2	a	Define co-efficient of fluctuation of speed and co-efficient of fluctuation of energy.	L1	5M
	b	The turning moment diagram for a multi cylinder engine has been drawn to a scale 1 mm = 600 N-m vertically and 1 mm = 3° horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows : + 52, – 124, + 92, – 140, + 85, – 72 and + 107 mm^2 , when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed ± 1.5% of the mean, find the necessary mass of the flywheel of radius 0.5 m.	L1	7M

UNIT-II

3	a	What is the function of a clutch? And what are its types.	L2	6M
	b	Explain with neat sketch working of an multiple disc clutch.	L2	6M

OR

4		A simple band brake operates on a drum of 600 mm in diameter that is running at 200 r.p.m. The coefficient of friction is 0.25. The brake band has a contact of 270°, one end is fastened to a fixed pin and the other end to the brake arm 125 mm from the fixed pin. The straight brake arm is 750 mm long and placed perpendicular to the diameter that bisects the angle of contact. 1. What is the pull necessary on the end of the brake arm to stop the wheel if 35 kW is being absorbed ? What is the direction for this minimum pull ? 2. What width of steel band of 2.5 mm thick is required for this brake if the maximum tensile stress is not to exceed 50 N/mm^2 ?	L5	12M

UNIT-III

5		The arms of a Porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20 N of load at the sleeve, determine how the speed range is modified.	L5	12M

OR

6		Define sensitivitiness of governor, Stability of Governor, Isochronous Governor & Hunting in Governor.	L1	12M

UNIT-IV

7		A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg,400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70° and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, Determine their magnitudes and angular positions.	L5	12M

OR

8		The four masses A,B,C and D are 100kg,150kg,120kg and 130kg attached to a shaft and revolve in the same plane. The corresponding radii of rotating are 22.5cm,17.5cm,25cm and 30cm and the angles measured from A and 45°,120° and 255°.Find the position and magnitude of the balancing mass,if the radius of rotation is 60cm.	L1	12M

UNIT-V

9	a	A shaft of 100mm diameter and 1 metre long is fixed at one end and other end carries a flywheel of mass 1 tonnes, taking Young's modulus for the shaft material as 200 GN/M^2 find the natural frequency of longitudinal vibrations.	L1	6M
	b	A spring -mass system has spring stiffness S N/M and a mass of 'm' kg it has the natural frequency of vibrations as 12 HZ an extra 2 kg mass is coupled to 'm' and The natural frequency reduces by 2 HZ find the value of'S' and 'm' .	L1	6M

OR

10		An instrument vibrations with a frequency of 1.24HZ when there is No damping when the damping is provided, the frequency of damped vibrations was observed to be 1.03HZ Find : i) the damping factor ii) the logarithmic decrement.	L1	12M

***** END *****