R18 Regulation *Subject code: 2P4CA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech IV Semester Supplementary Examinations, July 2024

DYNAMICS OF MACHINERY

(ME)

Maximum Marks: 70 Date:18.07.2024 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

	All the following questions carry equal marks (10X2M=20 Marks)	CO	Bloom Tx
1	Define Precesional angular motion	1	L1
2	Define right hand screw rule	1	L1
3	Define the clutch	2	L1
4	What is the difference between brake and Dynamometer?	2	L1
5	What is meant by fluctuation of Energy?	3	L1
6	Classify governors	3	L1
7	State why is balancing of rotating parts necessary for high speed engines	4	L1
8	Describe are in-line engines? How are they balanced? It is possible to balance them completely?	4	L1
9	Derive an expression for the natural frequency of free transverse vibrations for a simply supported	5	L1
10	Write the terms 'under damping, critical damping' and 'over damping'?	5	L1

Part-B

	Answer All the following questions. (5X10M=50Marks)		
11	Explain what you understand by gyroscopic stabilization. Illustrate with the help of a sketch how this is carried out in ships. The turbine rotor of a ship has a mass of 8 tones 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. [10M]	1	L2
	OR		
12	Describe, in detail, the complete static force analysis of the system of a reciprocating engine mechanism. [10M]	1	L2
13	A truck has 3.15 m wheel base & the C.G. is 1.28 m in front of the rear axle & 0.9 m above ground level. The co efficient of adhesion between tyres& road is 0.6 & the brakes are applied to the rear wheels only. Calculate the minimum distance in which the truck can be stopped on a level road when travelling at 48 kmph? If the weight of the truck is 8 tones, find the pressure on each wheel during braking? [10M]	2	L2

	OR		
14	A band brake acts o he 3/4th of circumference of a drum of 450 mm diameter which is keyed to the shaft. the band brake provided a braking torque of 225 N-m. One end of the band is attached to a fulcrum pin of the lever and the other end to a pin 100 mm from the fulcrum. If the operating force is applied at 500 mm from the fulcrum and the coefficient of friction is 0.25, calculate the operating force when the drum rotates in (a) anti clockwise, and (b) clockwise direction. [10M]	2	L2
15	The turning moment diagram of a multi cylinder engine is drawn to the following scales: Turning moment, 1mm = 500 N-m vertically;& 1mm = 35 horizontally, The intercepted areas between the output torque curve & the mean resistance line, taken in order from one end, are as follows : +53,-125,+93, -142, + 86, -73 & +108 mm^2. When the engine is running at a speed of 600 rpm. If the total fluctuation of speed is not to exceed± 1.6 % of the mean, Calculate the necessary mass of the flywheel of radius 0.6 m. [10M]	3	L2
	OR		
16	The mass of the flywheel of an engine is 6.5 tones & the radius of gyration is 1.8 m. It is found from the turning moment diagram that the fluctuation of energy is 56 KN-m. If the mean speed of the engine is 120 rpm, Calculate the maximum & minimum speeds. [10M]	3	L2
17	Four masses m1 ,m2, m3 and m4 are 200 kg , 300 kg , 240 kg , and 260 kg respectively. The corresponding radii of rotation are 0.2m , 0.15m, 0.25m and 0.3m respectively and the angles between successive masses are 45 degree, 35 degree and 135 degree. Calculate the postion and magnitude of the balance mass required, if its radius of the rotation is 0.2m. [10M]	4	L2
	OR		
18	A,B,C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B,C and D are 10 kg, 5 kg and 4 kg respectively. Calculate the required mass a and the relative angular settings of the four masses so that the shaft shall be in complete balance. [10M]	4	L2
19	A beam of length 10 m carries two loads of mass 200 kg at distances of 3 m from each end together with a central load of mass 1000 kg. Calculate the frequency of transverse vibrations. Neglect the mass of the beam and take I = 109 mm4 and $E = 205 \times 103$ N/mm2. [10M]	5	L2
	OR		
20	Derive an expression for the frequency of free torsional vibrations for a shaft fixed at one end and carrying a load on the free end. [10M]	5	L2