

Name:
Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: M.Tech
Programme: Rotating Equipments
Max. Marks: 100

Semester: I
Time: 03 hrs.

Instructions: Attempt all the questions. There is internal choice in section B and section C. Assume suitable data if missing. Use of data handbook is permitted.

SECTION A

S. No.		Marks	CO
Q 1	Explain the function and need of self-aligning rolling contact bearing.	4	CO3
Q 2	Discuss the various types of gear tooth failures.	4	CO1
Q 3	Define the formative number of teeth for bevel gear. Also, discuss its importance.	4	CO1
Q 4	Discuss the factors to be investigated while selecting a coupling.	4	CO4, CO5
Q 5	Draw and explain the curve showing variation of bearing modulus with coefficient of friction for journal bearing.	4	CO2

SECTION B

Q 6	It is required to design a bushed pin type flexible coupling for connecting two shaft of diameter 60 mm. The details of the duty required for the coupling are: Power to be transmitted by the coupling =135 KW Speed in rev/min =120 Take the bearing pressure on the bush 0.35 N/mm ² and the allowable shear stress in the material of pins as 25 N/mm ² . The allowable bending stress in the material of the pin is 50 N/mm ² .	15	CO5
Q 7	A full journal bearing of 0.10 m diameter by 0.15 m long supports a radial load of 5500 N. The shaft speed is 500 rev/min. The room temperature is 32 ^o C and the surface of the bearing is to be limited to 63 ^o C. Select suitable oil to satisfy the above requirements, if the bearing is well ventilated and no artificial cooling is to be used. Assume D/C _d =1000.	15	CO3
Q 8	Select a single row deep groove ball bearing for a radial load of 8000 N and an axial load of 3000 N, operating at a speed of 1440 rpm, for an average life of 4 years at 10 hours per day. Assume uniform and steady load. Take the bore diameter as 100 mm.	15	CO3
Q 9	Design a flange coupling to connect the shafts of a motor-pump set. The power to be transmitted is 30 kW at 1200 rpm. Determine the diameter of shafts for motor and pump. The allowable shear stress in the shafts is 50 MPa and the angle of twist is not to exceed 1-deg in length of 20 diameters. The allowable shear stress in the coupling	15	CO4

	bolts is 20 MPa. The maximum torque is 15 % more than the average torque. OR Design a clamp coupling to transmit 30 kW at 100 rev/min. The shaft and key are made of 40C8 steel having tensile yield stress of 320 MPa. There are 6 bolts connecting the two halves of the coupling. The bolts are made of 45C8 steel having tensile yield stress of 350 MPa. The coefficient of friction between the muff and the surface is 0.3. A factor of safety of 4 is desired.		
SECTION-C			
Q 10	A rawhide pinion is to transmit 30 KW at 1150 rev/min. Select a standard module for 20 degree full depth involute teeth, assuming medium shock condition and the power source as multi-cylinder engine. OR Two steel bevel gears, both having a Brinell hardness of 250, connect shafts at 90-deg. the teeth are 14 ^{1/2} -deg. full depth and the module is 5 mm. The number of teeth on the pinion and gear are 30 and 48 respectively. The face width is 38 mm. Determine the wear load.	20	CO1