E **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 51P03

M.E. DEGREE EXAMINATION, NOV 2018

First Semester

CAD/CAM

15PCD103- INTEGRATED MECHANICAL DESIGN

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 20 = 100 Marks)

1.	(a)	The bending stress in a machine part fluctuates between a tensile stress of 280N/mm2 and a compressive stress of 140N/mm2. What should be the minimum ultimate tensile strength of this part to carry this fluctuation indefinitely according to (i) Goodman's formula (ii) Soderberg formula actor of safety is 1. 75. Assume that the yield point is never likely to be less than55% of the Ultimate tensile strength or greater than 93 % of it.	CO1- App	(20)
		Or		
	(b)	Determine the thickness of a 120mm wide uniform plate for safe continuous operation if the plate is to be subjected to a tensile load that has a maximum value of 1000N.The properties of the plate materials are as follows. Endurance limit stress is 225MPa and yield point stress is 300MPa.The factor of safety based on yield point may be taken as 1.5.	CO1- App	(20)
2.	(a)	A hollow shaft of 40 m outer diameter and 25 mm inner diameter is subjected to a twisting moment of 120N-m,simultaneously,it is subjected to an axial thrust of 10Kn and a bending moment of 80N-m.Calculate the maximum compressive and shear stresses.	CO2- App	(20)
		Or		

(b) In a winch the rope supports a load W and is wound round a barrel of 450mmdiameter. A differential band brake acts on a drum 800mm diameter which is keyed to the same shaft as the barrel. The ends of the bands are attached to pins on opposite sides of the fulcrum of the brake lever and at a distance of 25mm and 100mm from the fulcrum . The angle of lap of the brake band is 250° and the μ is 0.25.What is the Maximum load W which can be supported by the brake when a force of 750N is applied at the distance of 3000mm from the fulcrum? CO2- App (20)

3. (a) A helical gears with 30° helix angle has to transmit 35 KW at 1500 rpm with a speed reduction ratio 2.5. If the pinion has 24 teeth. Assume 15 Ni 2 Cr 1 Mo 15 material for both pinion and wheel.5. In a spur gear drive for a rock crusher, the gears are made of case hardened alloy steel. The pinion is transmitting 18 KW at 1200 rpm with a gear ratio of 3.5. The gear is to work 8hrs/day for 3 years. Design the drive. CO3- App (20)

Or

(b) Design a bevel gear for two shafts whose axis are at right angles. The power transmitted is25 kW. The speed of the pinion is 300 rpm and of the gear is 120 rpm. The service is continue 8 hours per week for 3 years. select suitable material for pinion and wheel. CO3- App (20)

4. (a) A double shoe brake is capable of absorbing a torque of 1400N-m.The diameter of the brake drum is 350mm and the angle of contact for each shoe is 1000.If the co-efficient of friction between the brake drum and lining is 0.4,Calculate
(i) The spring force necessary to set the brake and
(ii) The width of the brake shoes, if the bearing pressure on the lining material is not to exceed0.3 N/mm^2 CO4- App (20)

Or

(b) An automotive type internal-expanding double shoe brake as shown in fig. The face width of the friction lining is 40mm and the intensity of normal pressure is limited to 1 N/mm2. The coefficient of friction is 0.32. The angle Θ1 is can be assumed to be zero. Calculate
(i) the actuating force P, and
(ii) the torque-absorbing capacity of the brake. CO4- App (20)

5.	(a)	Illustrate the design of a 9 speed gear box for a centre grinding machine spindle rotating at a speed ranging from 300 rpm to 1550 rpm. Assume all are spur gears. Design the kinematic arrangement, gear, gear box and layout.	CO5- Ana	(20)
		Or		
	(b)	Interpret the steps in designing a hoist unit for a EOT crane to the following specifications. Load to be lifted= 5ton, Type of hoist unit=Wire rope type, Height of the lift=6m,Lifting speed=6m/min, No of falls=4,Speed reducer=Worm type, Braking=Electro hydraulic Thruster type.	CO5- Ana	(20)