of the disc, find the maximum values of radial and hoop stress in the disc. Take Poisson ratio is 0.3. Mass density is equal to 7700 kg/m^3. **15**

6. A 125 mm × 75 mm × 10 mm unequal angle bar is placed with the longer leg verticals and used as a joint freely supported at the ends. It is subjected to a bending moment of 3000 N-m acting in the vertical plane through the centroid of the section. Find the Maximum bending stress induced in the section. **15**

Unit IV

7. A crane hook has a symmetrical treapezoidal section 56 mm deep, the inner and outer widths being 50 mm and 25 mm respectively. Estimate the extreme intensities of stress when the hook carries a load of 12.5 kN, the load line passing 50 mm from the inside edge of the section and the centre of curvature being in the load line. **15**

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B. Tech. EXAMINATION, May 2018

(Fourth Semester)

(B. Scheme) (Main & Re-appear)

(ME)

ME206B

STRENGTH OF MATERIALS-II

Time : 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

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Unit I

1. A cylinder shell is 3 m long, 1.5 m internal diameter and 20 mm metal thickness. Calculate the intensity of maximum shear stress induced and also the change in dimensions of the shell if it is subjected to an internal pressure of 2 N/mm^2. Take $E = 0.2 \times 10^6$ N/mm^2 and Poisson ratio = 0.3. **15**

2. A tick cylinder of external and internal diameter of 300 mm and 180 mm is Subjected to an internal pressure of 42 N/mm^2 external pressure 6 N/mm^2. Determine the stress in the material. Now if the external pressure is doubled, what internal pressure can be maintained without exceeding the previously determined maximum stress ? **15**

Unit II

3. A hollow shaft subjected to a pure toque, attains a maximum shearing stress t. Given that the strain energy stored per unit volume is $t^2/3G$, calculate the ratio of shaft diameters. Determine the actual diameter for such a shaft required to transmit 3700 kW at 110 rpm with uniform torque when the energy stored is 20 kJ/m^3 of the material. **15**

4. A solid circular shaft is subjected to a bending moment of 40 kN-m, ands a torque of 10 kN-m. Design the diameter of the shaft according to :

(a) Maximum principle stress theory

(b) Maximum shear stress theory

(c) Maximum strain energy theory,

if the stress at elastic limit is $200 N/mm^2$, Factor of safety is equal to 2 and Poisson ratio is 0.25. **15**

Unit III

5. A disc of uniform thickness and of 600 mm diameter rotates at 1800 rpm. Find the maximum stress developed in the disc. If a hole of 100 mm diameter is made at the centre

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8. Drive an expression for strain energy of a laminated spring. **5**

A laminated spring 1 m long is to support central load of 5.8 kN. If the maximum stress should not exceed 300 MN/m^2, calculate :

(a) Thickness of leaves

(b) Their number if each plate is 80 mm wide.

Take E = 200 GN/m^2. **10**

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