Saurav

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3 EXAMINATION- JUNE -2016

M.Tech 2nd Semester

COURSE CODE: **12M1WCE211** MAX. MARKS: 35

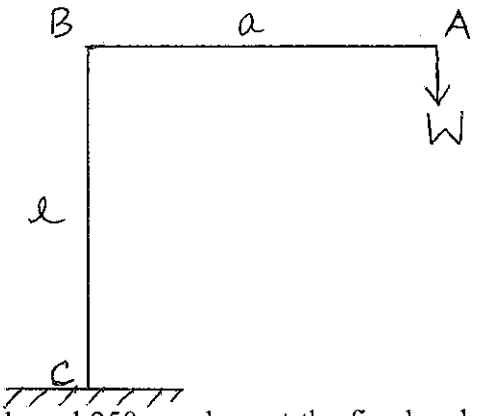
COURSE NAME: SOLID MECHANICS IN STRUCTURAL ENGINEERING

COURSE CREDITS: 03 MAX. TIME: 2 HRS

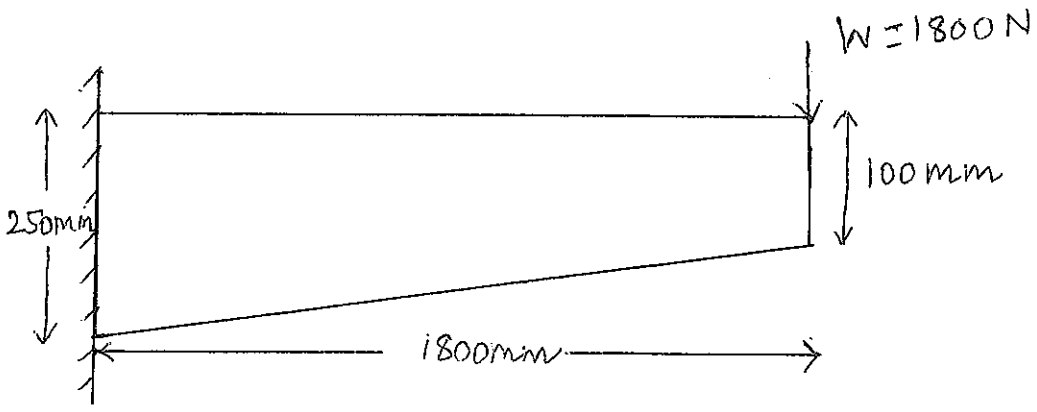
Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

Q1. In a tensile test a test piece 25mm dia,200mm gauge length stretched 0.0975mm under a pull of 50kN.In a torsion test the same rod twisted 0.025radian over a length of 200mm, when a torque of 400mm was applied. Evaluate the poison's ratio and the three elastic moduli for the material. **(5)**

Q2. Find the strain energy stored by the structure as shown in the fig below and hence compute the vertical deflection of the end A. Assume uniform section throughout. **(5)**

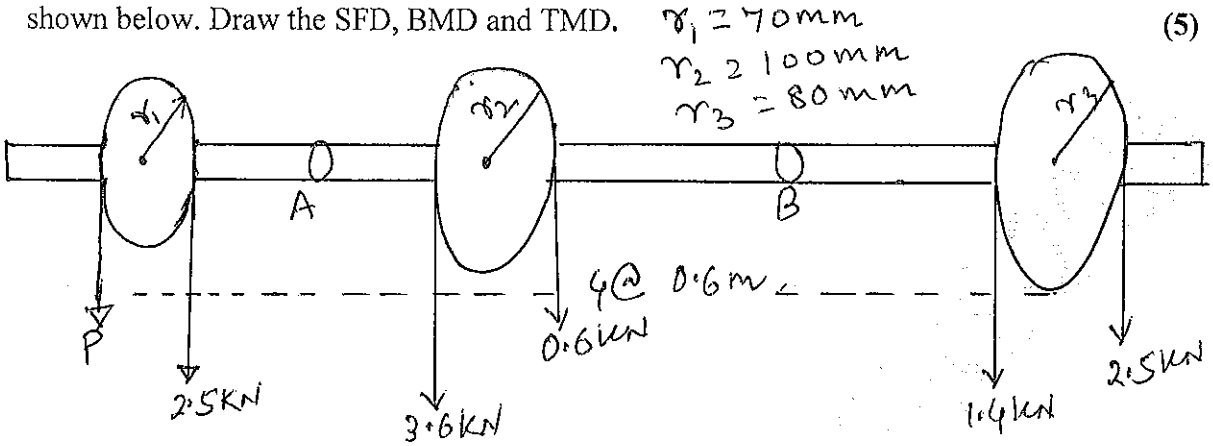


Q3. A timber cantilever of rectangular section is 75mm wide and 250mm deep at the fixed end and tapers uniformly to 75mm wide and 100mm deep at the free end. The projecting length is 1800mm and there is 1800mm and there is a load of 1800N at the free end. Calculate the deflection of the free end and the maximum bending stress. **(5)**



Q4. State and prove Castigliano's 1st and 2nd theorem **(5)**

Q5. A solid circular shaft of constant c/s carries three pullies and belts which are vertical as shown below. Draw the SFD, BMD and TMD. **(5)**



Q6. Derive moment of inertia of a thin tubular section (circular ring) of mean radius R and thickness't' **(5)**

Q7.

a) Discuss in brief different theories of failure. **(2.5)**

b) In a two dimensional stress system the two principal stresses are σ_1= **180N/mm^2 (tensile)** and σ_2 **(compressive).** For the material, yield stress in simple tension and compression is 240N/mm^2. According to maximum normal strain theory, **the value of** σ_2 at which yielding will commence **will be?** μ =0.25 **(2.5)**