

ST CLEMENTS UNIVERSITY - HIGHER EDUCATION SCHOOL
(NINE)

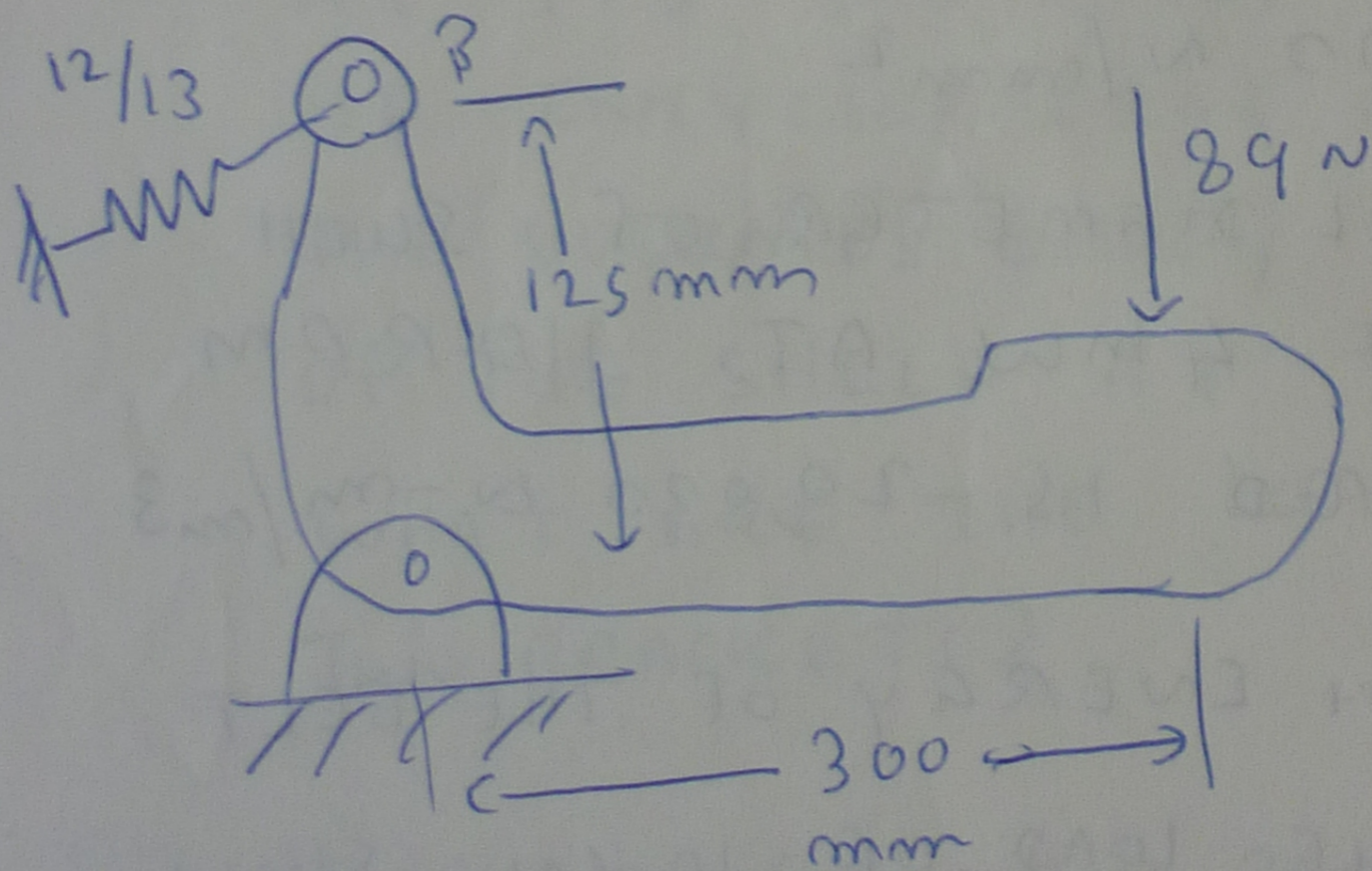
HIGHLIGHT COMPUTER GROUP - IOY TECHNICAL COLLEGE

BACHELOR OF APPLIED ENGINEERING (ELECTRICAL)

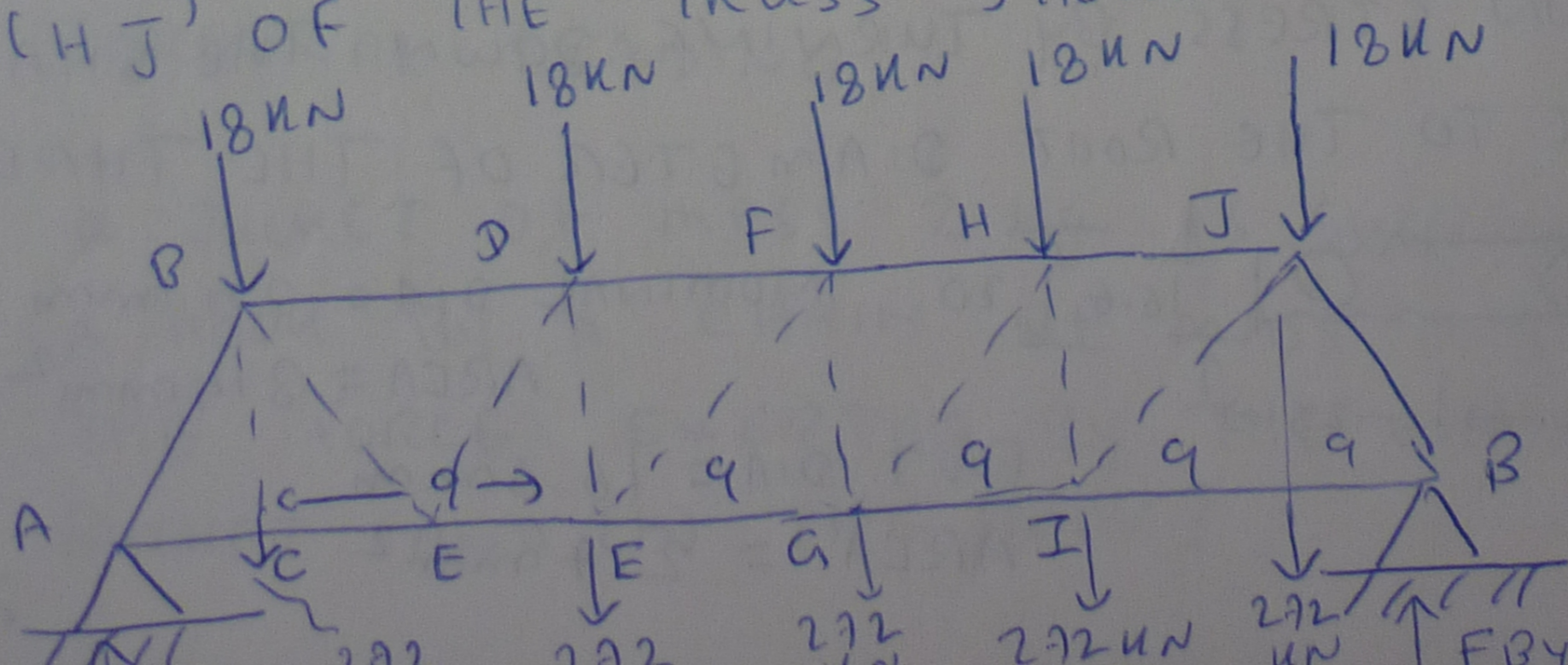
BAE 403 ENGINEERING MECHANICS TEST

TOTAL - 100, EACH - 10 MARKS

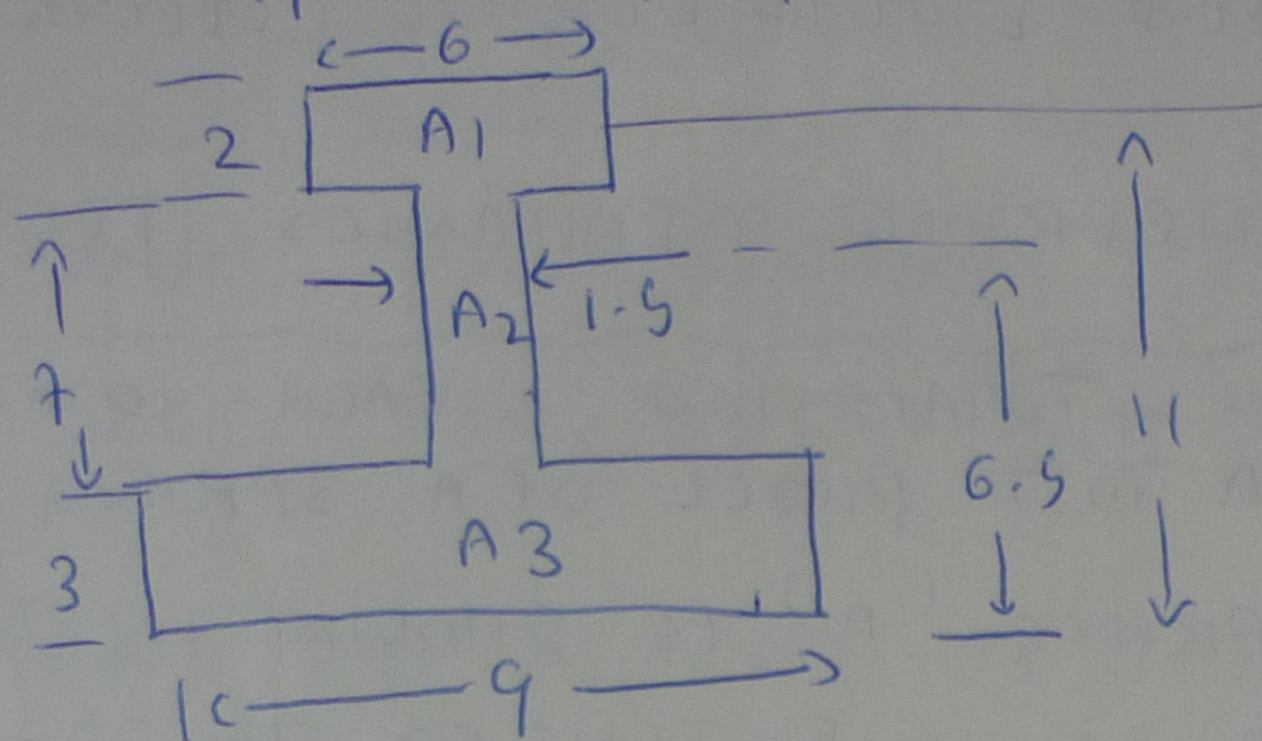
Q₁ THE FORCE ACTING ON A TEST PAD OF A SPRING IS CONTROLLED BY THE SPRING (A) IS SHOWN IN THE DIAGRAM. IF THE SPRING IS EXTENDED TO 33 mm, CALCULATE THE VALUE OF DISTRIBUTED FORCE N/mm TO PRODUCE A FORCE OF 139 N-m ON THE PIN AT (C) AND THE VALUE OF CONSTANT 'R' OF SPRING A-B



Q₂ DETERMINE THE FORCES IN MEMBER (DE) AND (HJ) OF THE TRUSS SHOWN



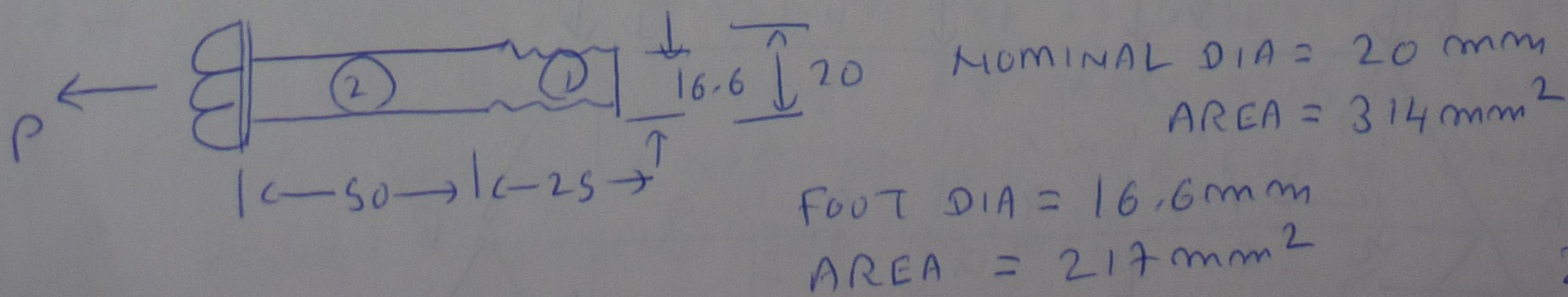
Q3 THE CROSS SECTION OF A CAST IRON BEAM IS SHOWN IN FIGURE, MAXIMUM PERMISSIBLE STRESS IS 2000 kg/cm^2 (TENSION) & 3000 kg/cm^2 (COMPRESSION). FIND MOMENT OF INERTIA.



Q4 A HOLLOW SHAFT SUBJECTED TO A PURE TORQUE ATTAINS A MAXIMUM SHEAR STRESS τ . GIVEN THAT THE STRAIN ENERGY PER UNIT VOLUME IS $\tau^2/30$. CALCULATE THE RATIO OF SHAFT DIAMETER. $G = 80,000 \text{ N/mm}^2$

DETERMINE THE ACTUAL DIAMETER OF SUCH A SHAFT TO TRANSMIT 4 MW AT 110 RPM WHEN ENERGY STORED IS $20,000 \text{ N-m/m}^3$

Q5 CALCULATE THE STRAIN ENERGY OF THE BELT SHOWN UNDER A TENSILE LOAD OF 10 kN. SHOW THAT THE STRAIN ENERGY IS INCREASED. FOR MORE UNKNOWN STRESS, BY TURNING DOWN THE SHANK OF THE BOLT TO THE ROOT DIAMETER OF THE THREAD.



- Q6 A MASS OF 500 kg STANDS ON A RAMP INCLINED AT 18.12° TO THE HORIZONTAL. THE COEFFICIENT OF FRICTION BETWEEN THE SURFACE OF THE MASS AND RAMP BEING 0.27 . IF IT IS ALLOWED TO MOVE FROM REST - FIND THE ACCELERATION OF THE MASS DOWN THE PLANE, THE VELOCITY AFTER 6 SEC. THE DISTANCE MOVED IN THIS TIME.
- Q7 FIND THE HEIGHT OF THE GOVERNOR ROTATING AT SPEED OF 50 TO 75 REV/MIN. FIND THE CHANGE IN HEIGHT.
- Q8 A SHELF 2 m LONG SUPPORTED BY BRACKETS AT ITS TWO ENDS. L AND R. CARRIES A SET OF ENCYCLOPAEDIAS OF TOTAL WEIGHT 100 N . THE VOLUMES OCCUPY A ONE METRE LENGTH OF THE SHELF AT THE LEFT HAND END. WHAT ARE THE LOADS F_L AND F_R ON THE TWO BRACKETS?
- Q9 EXPLAIN (a) NON ZERO STRESSES (b) NON ZERO STRAIN, (c) TORSION (d) COMBINED AXIAL & TORSIONAL LOADING
- Q10 A BUCKET OF MASS 2 kg IS SUSPENDED FROM A HOOK BY A CHAIN OF MASS 0.5 kg . WHAT IS THE FORCE EXERTED BY THE CHAIN ON (a) THE BUCKET AND (b) THE HOOK?