University Of Technology
Building and Construction Eng. Dept.
Final Exam – First Attempt – 2010/2011

Subject :Material Technology **Class: First**
Branch :All branches **Time : 3 Hours**
Examiner :- **Date:June/ 2011**

Note: Answer only four questions

Q1.A. Explain in details THREE of the followings:

1. Fiber saturation point
2. Manufacture of concrete brick
3. Metallic bond
4. Process of manufacture of hydrated lime (15 %)

Q1.B. During testing of concrete cylinder in compression, the original diameter of 150mm was increased by 0.01mm and the original length of 300mm was decreased by 0.17mm under the action of a compressive load P=230kN. Calculate the modulus of elasticity E and Poisson's ratio μ. (10 %)

Q2.A. Differentiate between the following:

1. Proton and electron
2. Resilience and toughness
3. High carbon steel and mild steel in uses
4. Ordinary plaster and technical plaster in chemical requirements (16 %)

Q2.B. Derive the generalized Hook's law equation for the body shown in Fig.1 (9 %)

Q3.A. Give the reasons of the followings:

1. Lumps of limestone remaining in the finished brick are undesirable
2. The concrete bricks can produced with various bearing capacity
3. Practically all lime used structurally is made up in the form of mortar by the addition of sand to lime paste
4. Carbon content doesn't affect on modulus of elasticity for steel (16 %)

Q3.B. Three pieces of wood are glued together and subjected to a force P=13.4kN as shown in Fig. 2. The cross section of each member is 40*90mm, and the length of the glued surfaces is 150mm. What is the average shear stress in the glued joints? (9 %)

Q4.A. Explain in details TWO of the followings and enhance your answer by sketch if possible:

1. The affect of heat treatment on the properties of steel
2. Fatigue failure and endurance limit
3. The cracks development during torsion test (10 %)

Q4.B. A steel bar having a cross sectional area of 160 mm2 carries the axial loads at the positions shown in Fig. 3 and to increase in temperature (ΔT) 110◦C. If the modulus of elasticity for steel 210 * 10^3 N/mm2 and α = 24*10^{-6}/ ◦C. Compute the total deformation of the bar length. Assume that the bar is suitably braced to prevent buckling. (15 %)

Q5. Data shows below are obtained during tensile test for shaft sample. If the original diameter: of the bar is 18mm and its diameter at breaking is 11.6mm, the gauge length is 200mm. Determine:

1. Load at proportional limit
2. Percentage of reduction in cross sectional area
3. Modulus of elasticity
4. Maximum load

5. Load at failure (25%)

Stress	N/mm^2	75	150	225	300	375	450	525	600	450
Strain	mm/mm	0.003	0.006	0.01	0.0125	0.015	0.018	0.05	0.075	0.225

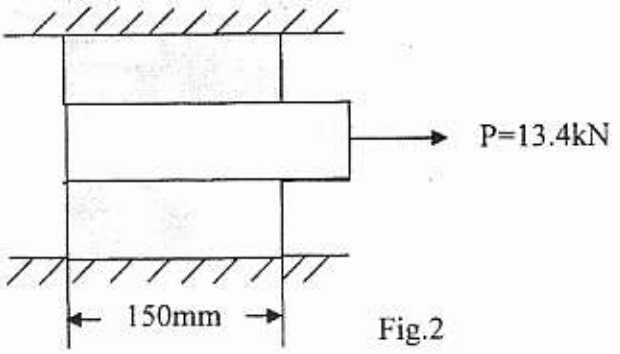

Fig.2

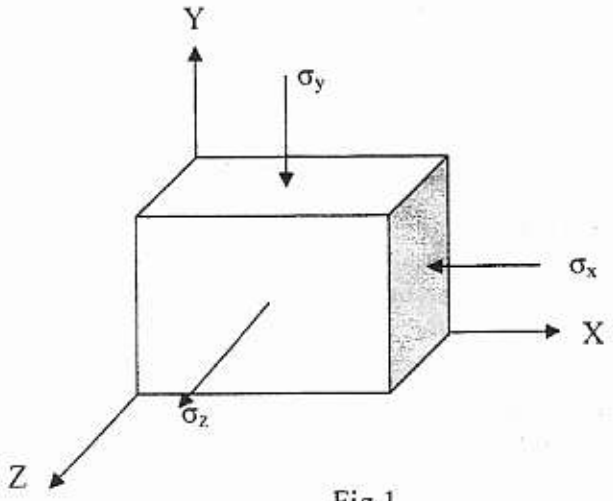

Fig.1

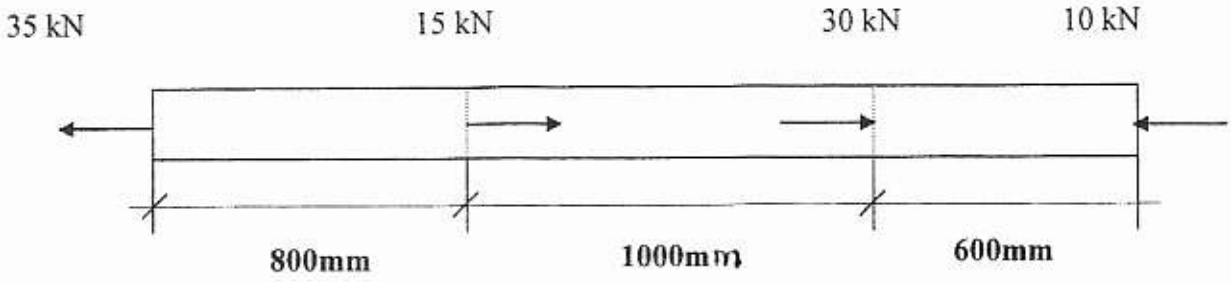

Fig. 3