N. B. 1. Attempt any four questions of the following.
   2. All questions carry equal marks.

1. Find the constants a, b, c, d if
   \[ f(z) = (x^2 + 2axy + by^2) + i(cx^2 + 2dxy + y^2) \] is analytic.

2. Find an analytic function whose real part is \( e^{2x}(xcos2y - ysin2y) \).

3. Find a bilinear transformation which maps the points 2, 1, 0 onto 1, 0, i.

4. Find the image of the region bounded by \( x = 0, y = 0, x = 1, y = 1 \). Under the
   transformation \( w = z + (2 - i) \).

5. Evaluate \( \int_{0}^{1+i} (x - y + ix^2) \, dz \), along the imaginary axis \( z = 0 \) to \( z = i \).

6. Find two distinct Laurent series expansion of the function \( f(z) = \frac{4z+3}{z(z-3)(z+2)} \), indicating
   ROC.

**** All the Best ****
Note: Question No. 1 is compulsory, Attempt anyone out of remaining questions.

Q.1) Attempt any Five Question

(2x5=10M)
a) Define Specific gravity and specific weight.
b) What do you understand by total pressure and centre of pressure?
c) Define surface tension and Bulk Modulus.
d) Write the relation between weight density and mass density.
e) State and Explain Newton’s Law of Viscosity.
f) Define atmospheric pressure, gauge pressure and absolute pressure.

Q.2)

a). State and prove Pascal’s Law.  

(5M)
b). Derive an expression for total pressure and centre of pressure for an inclined plane surface.  

(5M)

OR

Q.2). Two large horizontal plane surfaces are 20 m apart. This space is filled with glycerine. Find what force is required to drag a very thin plate of area 0.60 m² between the two surfaces at a speed of 0.70 m/sec.
   
   i) If the plate is equidistant from the surfaces.
   ii) If the plate is 7.5 m from one of the surfaces.

Take the dynamic viscosity of glycerine equal to $8.04 \times 10^{-1}$ Ns/m²
Q1 Attempt any five. (10 marks)

a) Compare direct ranging and reciprocal ranging.
b) Explain principles of surveying with suitable example.
c) Explain local attraction and its elimination.
d) Describe in tabular form the relation between:  
   a) F.B. & B.B.  c) WCB & RB

e) Define the term:  
   a) Dip  
   b) Declination

f) Define orientation and list their types.
g) Discuss advantages and disadvantages of plane table survey.
Q2 Attempt any one. (05 marks)

a) A survey line PQ intersects a hillock. In order to extend the line beyond the obstacle a perpendicular QR, 100 m long is set out at Q. From ‘R’ two lines RS and RT are set out at 45° and 60° with RQ respectively. Find the lengths RS and RT such that the points S and T lie on the prolongation of line PQ and also find the obstructed distance QS.

b) A and B are two points 367 m apart on the same bank of a river. The bearing of a lighthouse on the other bank observed from A and B are 36° 25’ and 319° 25’ respectively. Find the width of the river if the bearing of AB is 93° 25’.

Q3 Attempt any one. (05 marks)

a) A closed traverse is run anticlockwise in the form of regular pentagon ABCDEA. If the fore bearing of the traverse leg is 30° 0’. Find the bearings of the remaining traverse legs?

b) The following bearings were observed in the area where local attraction was suspected. Determine the correct magnetic bearings? Also calculate true bearings if the declination is + 3° 30’ W.

<table>
<thead>
<tr>
<th>LINE</th>
<th>PQ</th>
<th>QR</th>
<th>RS</th>
<th>SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.B.</td>
<td>S 40° 00’ W</td>
<td>S 80° 45’ W</td>
<td>N 20° 00’ E</td>
<td>S 80° 00’ E</td>
</tr>
<tr>
<td>B.B.</td>
<td>N 41° 15’ E</td>
<td>N 79° 30’ E</td>
<td>S 20° 00’ W</td>
<td>N 80° 00’ W</td>
</tr>
</tbody>
</table>

**********************ALL THE BEST********************
Unit test 1

Instructions:
Question No.1 is compulsory.

Q1 Attempt All (4 marks)
   a) Fore bearing
   b) Reduce level
   c) Bench mark
   d) Line of collimation

Q2 Attempt the following questions. (8 marks)
   a) Explain direct ranging and indirect ranging with neat sketch. (4 marks)
   b) What are the obstacles in chaining explain in detail. (4 marks)
      Or
   c) The following Consecutive reading were taken with a levelling instrument at interval of 20m.
      2.375, 1.730, 0.615, 3.450, 2.835, 2.070, 1.835, 0.985, 0.435, 1.630, 2.255 and 3.630 m.
      The instrument was shifted after the fourth and eight readings. BM of RL 100.200 m.
      Find the RLs of all the points. (8 marks)

Q3 Attempt the following questions. (8 marks)
   a) Explain the temporary adjustment of dumpy level. (4 marks)
   b) What is the reciprocal levelling? Explain with neat sketch. (4 marks)
      Or
   c) The following are the fore and back bearing of the side of a closed traverse. Calculate the
      interior angles of the traverse. (8 marks)

<table>
<thead>
<tr>
<th>Side</th>
<th>FB</th>
<th>BB</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>150° 30'</td>
<td>330° 15'</td>
</tr>
<tr>
<td>BC</td>
<td>20° 30'</td>
<td>200° 30'</td>
</tr>
<tr>
<td>CD</td>
<td>295° 45'</td>
<td>115° 50'</td>
</tr>
<tr>
<td>DE</td>
<td>218°</td>
<td>38°</td>
</tr>
<tr>
<td>EA</td>
<td>120° 30'</td>
<td>300° 30'</td>
</tr>
</tbody>
</table>
Q.1 Attempt any **FIVE**
   a. Explain normal stress, shear stress with neat sketch.
   b. Draw stress-strain curve for mild steel and mention salient points on the curve.
   c. Derive relation between E, G and K.
   d. State the relationship between Shear Force and Bending Moment.
   e. Explain Poisson's ratio with neat sketch.
   f. State the assumptions of theory of pure bending.

Q.2 Attempt any **ONE**
   a. A composite member of overall cross sectional size 50 mm x 30 mm is made up of steel and bronze. Thickness of each materials is 15 mm connected together to act as a single member. After the test under UTM it shows a compression of 0.014 mm in a length of 200 mm. Find load acting on each member and the total load. *Es* = 2 x 10^5 N/mm², *Eb* = 80 x 10^3 N/mm².
   b. A steel rod 20 mm in diameter and 1 m long is heated through 100° C and at the same time subjected to a pull of 'P'. If the total expansion of the rod is 2.5 mm, find the magnitude of 'P'. *Es* = 2 x 10^11 N/mm², α_c = 12 x 10^-6 /°C

Q.3 Attempt any **ONE**
   a. A simply supported beam is as shown in Fig 1, draw neat SFD and BMD for the beam.
   b. A cantilever beam 2m long carries a UDL of 2 kN/m over the entire span. The cross section is as shown in Fig 2. Determine the bending stresses at top and bottom and state the nature of the same.
Q.NO.1 Attempt any five. [5 x 2 = 10]
   a) Define a beam with neat sketch.
   b) Enlist formulae for the relationships between rate of loading, shear force and bending moment at a c/s of a beam and mention their uses.
   c) Define – 1) Statically Determinate Structure 2) POC.
   d) Define ‘Gauge length’, in-case of behaviour of ductile material under tension and write the formula of it.
   e) Define Stress and classify it.
   f) A copper rod 3 mm in diameter when subjected to a pull of 495 N extends by 0.07 mm over a gauge length of 100 mm. Calculate the Young’s modulus for copper.

Q.NO.2 Attempt any one. [1 x 5 = 05]
   a) A load of 2 MN is applied on a short concrete column 500 mm x 500 mm. The column is reinforced with four steel bars of 10 mm diameter, one in each corner. Find the stresses in concrete and steel bars. Take E for steel as 2.1 x 10^5 N/mm^2 and for concrete as 1.4 x 10^4 N/mm^2.

   b) If the ultimate shear stress for mild steel is 320 MPa, find the force required to punch a 12 mm diameter hole in a mild steel plate 10 mm thick. Calculate the compressive stress induced on the section of a punch.

Q.NO.3 Attempt any one. [1 x 5 = 05]
   a) Draw SF and BM diagrams for the beam loaded and supported as shown in figure (1).

   b) Draw SFD and BMD for the beam loaded and supported as shown in figure (2).
### Question 1

**Answer any 5**  
2x5=10

(a) Differentiate between central eruption and Fissure eruption and mention in which part of the earth they occur?  
2

(b) What is the Mohorovicic discontinuity and how it was discovered?  
2

(c) Differentiate between fracture and cleavage.  
2

(d) How will you differentiate between plutonic and volcanic igneous rock?  
2

(e) What is weathering and erosion?  
2

(f) Differentiate between Normal fault and Reverse Fault.  
2

### Question 2

(a) Classify various folds on the basis of axial plane  
5

**OR**

(b) Define texture, and explain any two structures of Igneous rocks. Comment on suitability of Igneous rocks as foundation rocks.  
5

PTO

---

### Question 1

**Answer any 5**  
2x5=10

(a) Differentiate between central eruption and Fissure eruption and mention in which part of the earth they occur?  
2

(b) What is the Mohorovicic discontinuity and how it was discovered?  
2

(c) Differentiate between fracture and cleavage.  
2

(d) How will you differentiate between plutonic and volcanic igneous rock?  
2

(e) What is weathering and erosion?  
2

(f) Differentiate between Normal fault and Reverse Fault.  
2

### Question 2

(a) Classify various folds on the basis of axial plane  
5

**OR**

(b) Define texture, and explain any two structures of Igneous rocks. Comment on suitability of Igneous rocks as foundation rocks.  
5

PTO
Q.3 (a) Name which geological agent is responsible for the following landform? Also mention whether it is an erosional or depositional Landform.

i) Pot holes   ii) yardang   iii) alluvial fan   iv) drumlin   v) butte

OR

(b) Identify the mineral with the help of given physical properties.

<table>
<thead>
<tr>
<th>Form</th>
<th>colour</th>
<th>Luster</th>
<th>Hardness</th>
<th>cleavage</th>
<th>composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tabular Crystals</td>
<td>Flesh Coloured</td>
<td>Pearly</td>
<td>6</td>
<td>Present</td>
<td>KAlSi₃O₈</td>
</tr>
<tr>
<td>Massive</td>
<td>Greyish Black</td>
<td>Metallic</td>
<td>2</td>
<td>Present</td>
<td>C</td>
</tr>
<tr>
<td>Fibrous</td>
<td>White</td>
<td>Silky</td>
<td>5.5</td>
<td>Present</td>
<td>M g₆ (Si₄O₁₀)(OH)₈</td>
</tr>
<tr>
<td>Foliaceous Or Lamellar</td>
<td>White</td>
<td>Pearly</td>
<td>2.5-3</td>
<td>Perfect Basal</td>
<td>(H,K) AlSiO₄</td>
</tr>
<tr>
<td>Granular</td>
<td>White</td>
<td>Pearly</td>
<td>1</td>
<td>Present</td>
<td>Mg₆(Si₈O₂₀)(OH)₂</td>
</tr>
</tbody>
</table>
### School of Engineering & Technology

**Subject:** Building Materials and construction  
**Marks:** 20  
**Class:** SE – Shift I  
**Date:** 02-09-16  
**Duration:** 1 Hr.  
**Branch:** S.E. Civil

#### 1) Choose the correct answer (1X10=10)

1. The rocks formed by gradual deposition, are called  
   a) sedimentary rocks  
   b) igneous rocks  
   c) metamorphic rocks  
   d) none of these.

2. The size of modular bricks, is  
   a) $10 \times 10 \times 9$ cm  
   b) $19 \times 9 \times 9$ cm  
   c) $22.5 \times 10 \times 8.5$ cm  
   d) $22.5 \times 8.0 \times 9$ cm.

3. The kiln which may work throughout the year, is  
   a) Clamp  
   b) Bull’s kiln  
   c) Hoffman’s kiln  
   d) none of these.

4. The minimum compressive strength of 1st class bricks should be  
   a) $75 \text{ kg/cm}^2$  
   b) $90 \text{ kg/cm}^2$  
   c) $100 \text{ kg/cm}^2$  
   d) $120 \text{ kg/cm}^2$.

5. The percentage of water for normal consistency, is  
   a) $5\%$ to $15\%$  
   b) $10\%$ to $25\%$  
   c) $15\%$ to $25\%$  
   d) $20\%$ to $30\%$.

6. The main ingredient of a good quality brick earth, is  
   a) magnesia  
   b) lime  
   c) silica  
   d) alumina.

### School of Engineering & Technology

**Subject:** Building Materials and construction  
**Marks:** 20  
**Class:** SE – Shift I  
**Date:** 02-09-16  
**Duration:** 1 Hr.  
**Branch:** S.E. Civil

#### 1) Choose the correct answer (1X10=10)

1. The rocks formed by gradual deposition, are called  
   a) sedimentary rocks  
   b) igneous rocks  
   c) metamorphic rocks  
   d) none of these.

2. The size of modular bricks, is  
   a) $10 \times 10 \times 9$ cm  
   b) $19 \times 9 \times 9$ cm  
   c) $22.5 \times 10 \times 8.5$ cm  
   d) $22.5 \times 8.0 \times 9$ cm.

3. The kiln which may work throughout the year, is  
   a) Clamp  
   b) Bull’s kiln  
   c) Hoffman’s kiln  
   d) none of these.

4. The minimum compressive strength of 1st class bricks should be  
   a) $75 \text{ kg/cm}^2$  
   b) $90 \text{ kg/cm}^2$  
   c) $100 \text{ kg/cm}^2$  
   d) $120 \text{ kg/cm}^2$.

5. The percentage of water for normal consistency, is  
   a) $5\%$ to $15\%$  
   b) $10\%$ to $25\%$  
   c) $15\%$ to $25\%$  
   d) $20\%$ to $30\%$.

6. The main ingredient of a good quality brick earth, is  
   a) magnesia  
   b) lime  
   c) silica  
   d) alumina.
7. The size of mould for bricks, is generally kept
   a) little large to specified size
   b) equal to specified size
   c) 10% larger than specified size

8. The main function of alumina in brick earth is
   a) To impart plasticity
   b) To make the brick durable
   c) To prevent shrinkage
   d) To make the brick impermeable

9. Advantages of clamp compared to a klin for burning bricks is that
   a) It takes less time for burning
   b) It gives more output for first class bricks
   c) It has less initial cost
   d) Suitable when bricks required in large numbers

10. The process of mixing clay, water and other ingredients to make the brick is known as
    a) Kneading
    b) Moulding
    c) Pugging
    d) Drying

2) a. Discuss different types of structures with neat sketches? (5X1=5)
    Or
    b. Explain Quarrying of stones?

3) a. What is glass? Gives it uses and types? (5X1=5)
    Or
    b. Explain the methods of manufacturing bricks?
1. Solve any two:
   (a) Explain vapour pressure and viscosity.
   (b) Explain 3 states of equilibrium of floating body.
   (c) Define Buoyancy and centre of buoyancy.

2. (a) State and prove Pascal’s Law.
   (b) A circular plate 1.5m in diameter is submerged in water, with its greatest and least depth below the surface being 2m and 0.75m respectively. Determine the total pressure on one face of the plate and position of centre of pressure.

3. (a) Solve any two.
   i. Two capillary tubes of diameter 1.50mm and 3 mm are dipped in an oil of surface tension 0.036 N/m and specific weight 9360 N/m³. Find the difference of oil levels in two tubes. Assume angle of contact = 25°.
   ii. Find the increase in pressure requires to produce 1 per cent reduction in volume of water. Take bulk modulus of elasticity of water k = 2.16 GPa.
   iii. Find the density of a metallic body which floats at the interface of mercury of S =13.6 and water such that 32% of its volume is submerged in mercury & 68% in water.