

# 17420

**11920**

**3 Hours / 100 Marks**

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
  - (8) Preferably write the answers in sequential order.

**Marks**

1. a) **Attempt any SIX of the following:**

**12**

- (i) Define minerology.
- (ii) State any two engineering uses of igneous rock.
- (iii) Define dip and strike.
- (iv) Define faults and state any two types of fault.
- (v) Draw three phase diagram for partially saturated soil.
- (vi) Define soil as per IS.
- (vii) State two uses of soil
- (viii) Define voids ratio and porosity.

P.T.O.

b) **Attempt any TWO of the following:**

8

- (i) Explain any four field applications of geotechnical engineering knowledge.
- (ii) Define any four types of folds and explain any one.
- (iii) Explain the classification of rock based on the mode of origin.

2. **Attempt any FOUR of the following:**

16

- a) Explain the formation process of soil and state any two types of soil in India.
- b) Define focus, epicenter, seismograph and isoseismic lines with sketch.
- c) State any four causes of earthquake.
- d) State any four effects of earthquake.
- e) State any four considerations to construct earthquake resistant structures.
- f) Explain the determination of plastic limit of soil.

3. **Attempt any FOUR of the following:**

16

- a) Explain the mechanical sieve analysis test carried out on soil sample to classify it.
- b) State the Darcy's law of permeability with expression. Hence define coefficient of permeability.
- c) State any four characteristics of flownet with sketch.
- d) Explain the direct shear test to determine shear strength of soil.
- e) Determine the value of cohesion and angle of internal friction from the following observations taken during direct shear test.

Normal Stress (N/mm <sup>2</sup> )	0.5	1.0	1.5	2.0	2.5
Shear Stress (N/mm <sup>2</sup> )	0.3	0.8	1.25	1.55	1.95

- f) State any four assumptions made in Terzaghi's analysis of bearing capacity failure of soil.

- 4. Attempt any FOUR of the following:** **16**
- a) Explain the effect of water table on bearing capacity on soil.
  - b) Differentiate between active earth pressure and passive earth pressure with sketch.
  - c) Explain standard proctor test on soil to determine OMC and MDD of soil with sketch.
  - d) State the necessity of site investigation. (any four)
  - e) State the practical applications of various types of compaction equipments. (any four)
  - f) State necessity and soil exploration. What is the criteria for deciding the number of test-pits site investigation?
- 5. Attempt any TWO of the following:** **16**
- a) If the soil sample weighs 180 gm after drying and 200 gm before drying, calculate its water content. The soil sample has specific gravity of 2.7 and porosity 30%, calculate degree of saturation and voids ratio.
  - b) Explain the determination of liquid limit of soil with neat sketches.
  - c) Define coefficient of uniformity and coefficient of curvature. Calculate  $C_u$  and  $C_c$  if  $D_{10} = 0.90$  mm,  $D_{30} = 1.18$  mm and  $D_{60} = 2.30$  mm
- 6. Attempt any TWO of the following:** **16**
- a) A soil sample 15 cm long and 10 cm in dia. is tested in falling head permeameter, having diameter of burette pipe 0.5 cm. If the initial head of 65 cm is dropped to 35 cm in 12 minutes, find the coefficient of permeability of soil in meter/day.
  - b) Explain plate load test with neat sketch to determine bearing capacity of soil.
  - c) Explain California bearing Ratio Test with neat sketch to determine % CBR of given soil sample.
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