Diploma in Civil Engineering / Diploma in Electrical & Mechanical Engineering

Term-End Examination

June, 2006

BCE-036 : SOIL, ROADS AND AIRFIELDS

Time : 2 hours   *Maximum Marks : 70*

Note : *Attempt **five** questions in all. Question no. 1 is **compulsory**. Attempt any **four** questions from the remaining questions. Use of calculator is allowed. Graph papers to be supplied on request.*

1. Choose the correct alternative :   2×7=14

    (a) If the voids of a soil mass are full of air only, the soil is termed as

         (i)   air entrained soil

         (ii)   partially saturated soil

         (iii) dry soil

         (iv)   dehydrated soil

(b)   With the increase in the amount of compaction energy

    (i)   optimum water content increases but maximum dry density decreases

    (ii) optimum water content decreases but maximum dry density increases

    (iii) both optimum water content and maximum dry density increase

    (iv) both optimum water content and maximum dry density decrease

(c)   Which of the following premix methods is used for base course ?

    (i)   Bituminous carpet

    (ii) Mastic asphalt

    (iii) Sheet asphalt

    (iv) Bituminous bound macadam

(d)   The most suitable equipment for compacting clayey soils is a

    (i)   smooth wheeled roller

    (ii) pneumatic tyred roller

    (iii) sheep foot roller

    (iv) vibrator

(e) A long and comparatively narrow strip which is used for landing and take-off of aeroplanes is known as

    (i) Runway

    (ii) Over-Run

    (iii) Apron

    (iv) Taxiway

(f) Transverse gradient of D and E types runway pavements should **not** exceed

    (i) 1%

    (ii) 1·5%

    (iii) 2·0%

    (iv) 2·5%

(g) The minimum spacing for airports serving small general aviation aircrafts under VFR conditions should be

    (i) 160 km

    (ii) 25 km

    (iii) 6·4 km

    (iv) 3·2 km

2. (a) Using phase relationships, show that saturated density can be expressed as

$$\rho_{sat} = \left(\frac{G_s + e}{1+e} \right) \rho_w$$

where all the terms have their usual meaning.   7

(b) The weight of a soil in its dry state is 150 N. When some water is added to it, its weight increases to 180 N and it has a volume of 0.01 m^3. If $G_s = 2.70$, $\rho_w = 10 \text{ kN/m}^3$, calculate the moisture content, void ratio, dry unit weight and moist unit weight. 7

3. (a) Describe the compaction process of cohesionless and cohesive soils in brief. 5

(b) The following are the results of a standard compaction test performed on a sample of soil :

S. No.	Water content %	Wet unit weight kN/m³
1	11	17·90
2	13	19·32
3	15	20·64
4	17	20·48
5	19	20·24
6	21	19·81
7	23	19·64

Plot the water content – dry density curve and obtain the optimum water content and maximum dry density. 9

4. (a) Describe the general guidelines for selection of highway alignment in India. 7

(b) Explain the components of a highway project report. 7

5. (a) Describe the specification and construction procedure of a Water Bound Macadam Road. 7

(b) Explain the various equipments used in the construction of roads. 7

6. (a) Describe the three controls of an aircraft. 7

(b) Explain the functions of tricycle under-carriage. 7

7. (a) Describe the important factors required to be considered for site selection of a new airport. 7

(b) Explain the importance of runway orientation. 7

8. Write short notes on the following : $4 \times 3\frac{1}{2}$

(a) Liquid Limit

(b) Field Compaction

(c) Wind Rose

(d) Airport Classification