

Diploma in Civil Engineering

Term-End Examination

December, 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 :

7×2

(a) A soil has a bulk density of 22 kN/m^3 and water content 10%. The dry density of the soil is

(i) 18.6 kN/m^3

(ii) 20 kN/m^3

(iii) 22 kN/m^3

(iv) 23.2 kN/m^3

- (b) The maximum dry density upto which any soil can be compacted depends upon
- (i) moisture content only
 - (ii) amount of compaction energy only
 - (iii) both moisture content and amount of compaction energy
 - (iv) None of the above
- (c) In hill roads the side drains are provided
- (i) only on hill side of road
 - (ii) only on the opposite side of hill
 - (iii) on both sides of road
 - (iv) None of the above
- (d) Most suitable material for highway embankments is
- (i) granular soil
 - (ii) organic soil
 - (iii) silts
 - (iv) clays
- (e) Portion of the airport other than the landing area is known as
- (i) Approach zone
 - (ii) Terminal area
 - (iii) Approach area
 - (iv) Shoulders

(f) Which of the following corrections is **not** applied to basic runway length ?

- (i) Corrections for elevation
- (ii) Corrections for temperature
- (iii) Corrections for sag
- (iv) Corrections for gradient

(g) Runway is usually oriented in the direction of

- (i) Head wind
- (ii) Cross wind
- (iii) Wind rose
- (iv) Prevailing wind

(a) Using phase relationships, show that relationship between porosity (η) and void ratio (e) can be represented as

$$e = \frac{\eta}{1 - \eta}$$

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(b) A soil is compacted at 50 percent moisture content and has a unit weight of 16 kN/m^3 . Calculate its void ratio, specific gravity, dry unit weight and submerged unit weight.

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(a) What do you mean by Compaction ? Explain its significance.

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

S. No.	Moisture content m%	Bulk unit weight kN/m^3
1	7.1	18.70
2	9.0	20.39
3	11.1	22.00
4	13.0	21.10
5	14.9	19.43
6	16.8	18.10

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

4. (a) Describe the main features of the Nagpur plan.
(b) Explain the considerations for selection of alignment of desert roads.
5. (a) Describe the various operations involved in the construction of modern concrete road.
(b) Explain the main considerations in embankment design.
6. (a) Describe the important characteristics of an aircraft.
(b) Explain the functions of 'Fuselage' and 'Wings' of an aircraft.

7. (a) Describe the important factors required to be considered for improvement of existing airports. 7
- (b) Explain the necessity of runway maintenance. 7
8. Write short notes on the following : $4 \times 3 \frac{1}{2}$
- (a) Shrinkage Limit
- (b) Zero Air Void Line
- (c) Terminal Area
- (d) Basic Runway Length