Total No. of Questions : 12]

SEAT No. :

P3933

[Total No. of Pages : 4

[4760] - 92

M.E. (Civil) (Water Resources and Environmental Engineering)

DAM ENGINEERING

(2008 Pattern) (Elective - IV) (Semester - II)

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q4, Q.5 or Q.6 from Section - I.***
2) ***Solve Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.***
3) ***Answer any 3 questions from each section.***
4) ***Answers to the two sections should be written in separate books.***
5) ***Neat diagrams must be drawn wherever necessary.***
6) ***Figures to the right indicate full marks.***
7) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
8) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Enumerate various forces acting on gravity dam. Give the expression for each of them. **[4]**

b) A gravity dam is 10 m high. It has a top width of 1m and base width 9m. the front face is vertical. Assume that the weight of concrete is 2400 kg/m^3 and the water is stored upto the top of the dam. Take density of water as 1000 kg/m^3. **[10]**

Find i) Stability against overturning.

ii) Compressive stresses and principal stresses at the toe and heel of the dam.

iii) Shear stress at the toe and heel of the dam.

Consider only self weight of dam and water pressure.

c) A solid gravity dam is to be constructed with concrete (1:2:4). Find out the height up to which the dam may be considered as a low dam. Draw a neat section of the low dam for this height. **[4]**

OR

P.T.O.

Q2) a) Write short note on earthquake pressure in gravity dams. Explain in detail effect of horizontal and vertical acceleration. **[8]**

b) Explain elementary profile of gravity dam with neat sketch. Also discuss the stress intensities in elementary profile. **[6]**

c) What are the different methods of stability analysis of gravity dam? Explain analytical method in detail. **[4]**

Q3) a) What are salient features of an arch dam and different types of arch dam? Derive an equation for best central angle of arch dam. **[10]**

b) Explain the design criteria for arch dam? **[6]**

OR

Q4) a) What are the different methods of design of an arch dam? Explain thin cylinder theory in detail. **[10]**

b) What are the various forces acting on arch dam? **[6]**

Q5) a) What are the various causes of failures of earthen dam? Draw neat sketches. **[8]**

b) A homogeneous earth dam has a section as shown in fig. -1. It is provided with a horizontal filter 20 m long on the D/S side. Draw the base parabola and indicate the adjustments required to obtain phreatic line form it. **[8]**

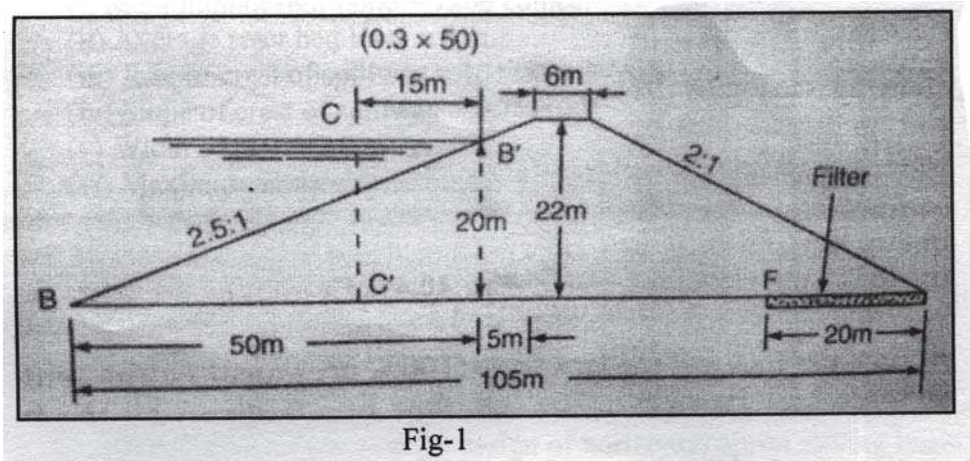

Fig-1

OR

Q6) a) Calculate the seepage per meter length through the body of the dam section shown in fig.-2. Assume coefficient of permeability $K = 8 \times 10^{-4}$ cm/sec. **[8]**

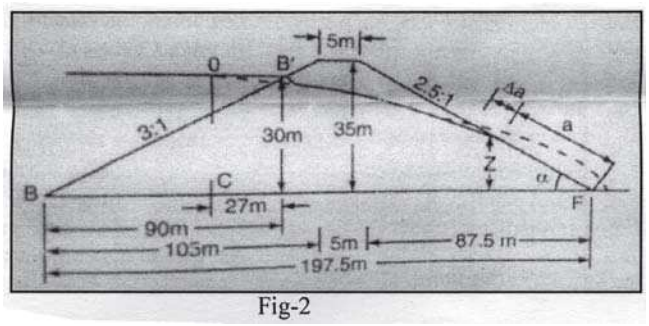

Fig-2

b) Draw a cross-section of an earth dam with the following data : **[8]**
R.L. of natural surface at site = 100.00 m
R.L. of F.R.L. = 118.30 m
R.L. of H.F.L. = 121.30 m Slope of saturation line 4:1. Assume other data.

SECTION - II

Q7) a) Explain the various types of rockfill dams and draw the sketches for each of them. **[10]**

b) What are the various methods of construction of rockfill dams? Explain any one in detail. **[8]**

OR

Q8) a) Explain the concept and design of Buttress dam. Also discuss the merits and demerits of buttress dam over gravity dam. **[10]**

b) Draw plan and an elevation of a flat slab deck type buttress dam and describe the important features of the same. **[8]**

Q9) a) Design an Ogee shape gated spiliway for the following data: **[10]**
i) Maximum design flood = 1200 cumec.
ii) Average river bed level = 0 m.
iii) R.L. of crest of spillway = 101.00 m.
iv) Slope of crest of spillway = 0.7H : IV.
v) Width of pier = 2.0 m
vi) Maximum allowable water level during flood = 105.00 m
Assume number of span as 7, clear way of each span as 10.0 m and ka = 0.1, Kp = 0.01.

b) Explain energy dissipation arrangement for the following two cases:**[6]**
i) T. W. C. coincides H. J. C.
ii) T. W. C. always above H. J. C.

OR

Q10)a) Describe Indian Standard practice for design of horizontal apron stilling basin for a dam spillway. **[8]**

b) Describe the Creager's method of designing profile of a overflow spillway. **[8]**

Q11)a) Explain with neat sketches: **[8]**

i) Remiolds automatic gate

ii) Visvesvaraiya's gate

b) What are the advantages of gated spillway. **[8]**

OR

Q12)a) Explain with neat sketches : **[8]**

i) Drum gate

ii) Stoney gate

b) What are sluices? What functions they serve? Describe Dharwar and Belgam type briefly whit the help of sketches. **[8]**

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