Total No. of Questions :12]

SEAT No. :

P4234

[Total No. of Pages :4

[4860]-618

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

DAM ENGINEERING

(2012 Pattern) (Semester - II) (Elective -IV) (501612)

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

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, 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) Calculate the maximum and minimum normal stress intensities at the base of the dam section shown in fig-1 when the reservoir is

i) empty and

ii) full.

Neglect earthquake effect. Also calculate sliding factor and shear friction factor of safety. Assume shear strength 35 kg/sq. cm, coefficient of friction μ as 0.75 and weight of concrete 2400 kg/m^3. **[10]**

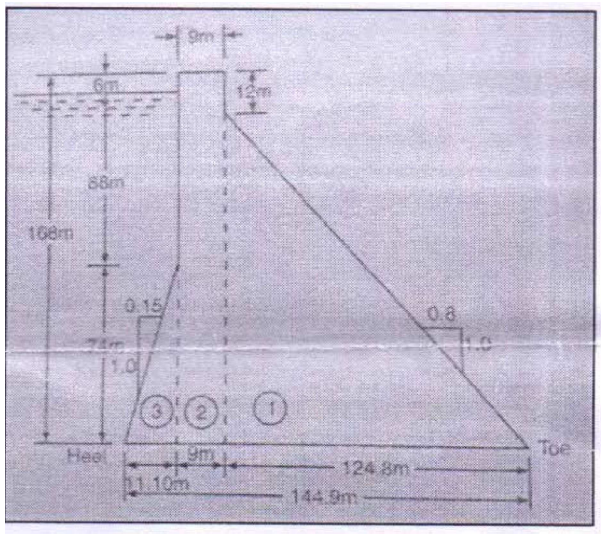

Fig-1

P.T.O.

b) What is an elementary profile of a gravity dam? Explain how it is different from practical profile. **[4]**

c) Write short note on construction and contraction joints in gravity dam. **[4]**

OR

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

b) Mention the various forces acting on a gravity dam. How are they determined? **[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 limitations of thin cylinder theory? **[6]**

Q5) a) Draw a typical section of an earth dam and explain the functions performed by each component. **[8]**

b) A homogeneous earth dam has a section as shown in fig -2. 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 from it. **[8]**

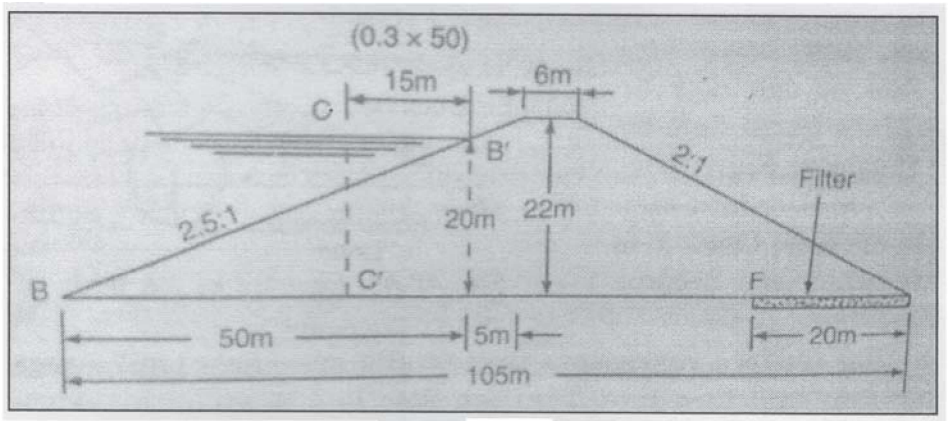

Fig-2

OR

Q6) a) Calculate the seepage per meter length through the body of the dam section shown in fig-3. Assume coefficient of permeability $K = 8 \times 10^{-4}$ cm/sec. **[8]**

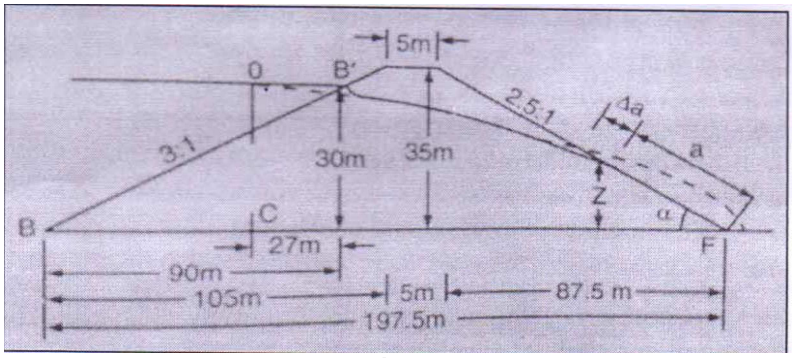

Fig-3

b) Draw sketches of earth dam cross-sections for the following three cases, when both pervious and impervious materials are available in the field.**[8]**

i) Impervious foundation to a large depth.

ii) Pervious foundation to some depth and then impervious material downwards.

iii) Pervious foundation to a large depth.

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 spillway 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 : 1V.

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 10.0m 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 with the help of sketches. **[8]**

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