Total No. of Printed Pages : 7 **Roll No. .....**

1[CCE.M]1

Civil Engineering-II

(06)

Time : Three Hours Maximum Marks : 300

INSTRUCTIONS

(i) Answers must be written in English.

(ii) The number of marks carried by each question is indicated at the end of the question.

(iii) The answer to each question or part thereof should begin on a fresh page.

(iv) Your answers should be precise and coherent.

(v) The part/parts of the same question must be answered together and should not be interposed between answers to other questions.

(vi) Candidates should attempt question no. **1** which is compulsory and **three** more questions from any **two** sections.

(vii) If you encounter any typographical error, please read it as it appears in the text book.

(viii) Candidates are in their own interest advised to go through the General Instructions on the back side of the title page of the Answer Script for strict adherence.

(ix) No continuation sheets shall be provided to any candidate under any circumstances.

(b) What is waterlogging ? What are the causes for its occurrence ? What are the ill-effects of waterlogging ? 25

(c) After how many days will you order irrigation in order to ensure healthy growth of crops, if

Field capacity of soil	=	29%
Permanent wilting percentage	=	11%
Density of soil	=	1300 kg/m^3
Effective depth of root zone	=	700 mm
Daily consumptive use of water for the given crop	=	12 mm

For healthy growth moisture content must not fall below 25% of the water holding capacity between the field capacity and the permanent wilting point. 25

7. (a) (i) What do you understand by the infiltration gallery ? Under what conditions you will recommend the same as an intake for water losses ? Draw a sketch of an infiltration gallery and discuss the advantages and disadvantages. 15

(ii) Describe briefly the possible sources of water for public water supply for a city. What are the factors which govern the final choice of the source ? 10

(b) (i) Discuss briefly types of clarifiers in sewage treatment and their design criteria. 10

(ii) Design in detail an imhoff tank for a population of 40,000. Given :

Maximum hourly flow	=	1/16 of the daily flow
Volume of fresh sludge	=	1 lit/cap/day
Volume of digested sludge	=	0.26 lit/c/day
Water consumption	=	135 lit/day 15

(ii) Explain absorption and saturation factors with regard to bricks. 10

(iii) Explain the differences between various grades of ordinary Portland cement. 5

(b) Differentiate clearly between (i) single roof, (ii) double roof and (iii) trussed roofs. 25

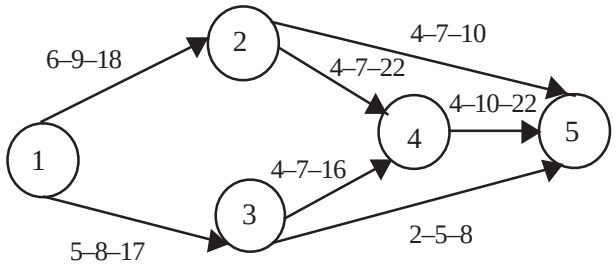
(c) What do you understand by total float ? How is it determined ? What is its importance in network planning ? 25

3. (a) What is the importance of damp proofing for a building ? Write about the different types of damp proofing materials generally used. 25

(b) Describe the various types of constituents of paint, mentioning the specific functions of each. 25

(c) In the following figure, the time estimates in days for each activity are indicated. Determine the critical path and the probability of completing the project in days. The non exceedance probability (P_r) for various values of the probability factor Z is as follows :

Z	:	1.0	1.1	1.2	1.3
P_r(%)	:	84.13	86.43	88.49	90.32



25

SECTION–B

4. (a) (i) What are the component parts of a permanent way for railway track ? State the principal requirements of an ideal permanent way. 10

(ii) Explain what is meant by the capacity of railway track and suggest different measures to increase the track capacity. 10

(iii) Draw a typical dimensional cross-section of BG track in embankment on a straight track and mark the details. 5

(b) On a B.G. 3^{o} curve, the Equilibrium Cant is provided for a speed of 70 kmph.

(i) Calculate the value of Equilibrium Cant.

(ii) Allowing a maximum Cant deficiency, what would be the maximum permissible speed on the track ? 25

(c) (i) What factors affect thickness design of pavements ? Describe briefly the CBR method of designing pavements. 5

(ii) Calculate the extra widening of pavement and the length of transition curve needed on a two lane highway having a longitudinal circular curve of radius 300 m. Design speed 80 kmph, length of wheel base of largest vehicle = 6.0 m. 10

(iii) Enumerate the basic requirements of road intersection of grade, sketch the completely channelised intersections of Tee cross firms. 10

5. (a) What is creep ? Discuss the theories propounded for the probable causes of creep. 25

(b) Explain briefly the various design factors that are to be considered in rotary intersection design. 25

(c) Calculate the stress at interior, edge and corner regions of a cement concrete pavement using Westergaard's Stress Equations. Use the following data :

Wheel load	P =5100 kg
Modulus of elasticity of cement concrete	$E = 3.0*10^{5}$ kg/cm^2
Pavement thickness	h = 18 cm
Poisson's ratio of concrete	μ = 0.15
Modulus of subgrade reaction	k = 6.0 kg/cm^3
Radius of contact area	a = 15 cm

25

SECTION–C

6. (a) (i) Design a regime channel for a discharge of 35 m^3/sec with silt factor of 0.9 by Lacy's theory, taking side slopes as 1 H to 2 V. 15

(ii) The base period, intensity of irrigation and duty of water for various crops under the canal systems are given. Determine the reservoir capacity if the culturable command area is 40,000 hectares, canal losses are 25% and the reservoir losses are 15%. 10

Crop	Base period in days	Duty of water at fields (hect/m^3/sec)	Irrigation intensity (%)
Wheat	120	1800	20
Sugarcane	360	1700	20
Cotton	180	1400	10
Rice	120	800	15
Vegetables	120	700	15

(x) Candidates shall put a cross (X) on blank pages of Answer Script.

(xi) No blank page be left in between answer to various questions.

(xii) Assume missing data suitably.

1. Answer any **three** of the following subdivisions including **(d)** which is compulsory :

(a) (i) Describe briefly how Portland slag cement is manufactured. What are the ingredients ? Write the advantages of Portland slag cement over ordinary Portland cement. 10

(ii) What are the important design considerations for load bearing wall ? 10

(iii) List out any five important tests conducted on the bricks. 5

(b) Explain the different types of station yards with the help of neat sketches. Explain the functions and types of marshalling yards. 25

(c) How will you determine the area mean rainfall over a basin by :

(i) Arithmetic mean method

(ii) Thiessen polygon method

(iii) Isohyetal method. 25

(d) What factors do you consider in selecting a site for the location of a distribution reservoir and how do you decide the full supply level in it ? 25

SECTION–A

2. (a) (i) What is meant by the term "Workability of Cement" ? List the methods used for measurement of workability of concrete. Clearly indicate the aspect of workability measured by each method. 10

(c) (i) Draw a neat sketch showing water and sanitary fittings required for a building and prepare a list of plumbing materials. 10

(ii) 125 cumecs of sewage of a city is discharged in a perential river which is fully saturated with oxygen and flows at a minimum rate of 1600 cumecs, with a minimum velocity of 0.12 m/sec. If the 5 day BOD of sewage is 300 mg/litre, find out when the critical DO deficit will occur.

Assume : Coefficient of purification of river as 4.0

Coefficient of DO is 0.11

Ultimate BOD is 125% of the 5 day BOD of the mixture of sewage and river water. 15