

AEN (Mains) - 2013 **SEAL** AEN (Mains) 2013 30-5-11 2.00 PM

FOR EVALUATOR'S USE ONLY

Sub. Code : **54**

Optional Paper

Civil Engineering : Paper-II

Time : 3 Hours / Maximum Marks : 200 / Total Pages : 32

Evaluation Table												(For Evaluator's Use Only)	
PART-A				PART-B				PART-C				Grand Total	
QN	E-1	E-2	AC	QN	E-1	E-2	AC	QN	E-1	E-2	AC	PART-A	
1				21				33				PART-B	
2				22				34				PART-C	
3				23				35				Total	
4				24				36				(-) Marks	
5				25				37				Final Total	
6				26				38				Marks in Words	
7				27				39					
8				28									
9				29									
10				30								Remarks of Evaluator/Chief Evaluator	
11				31									
12				32									
13													
14													
15													
16													
17													
18												Remarks of Scrutiniser	
19													
20													
Total													
Evalu ator's Sign													



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PART - A

Marks : 40

Note : Attempt all the twenty questions. Each question carries 2 marks. Answer should not exceed 15 words.

1 Define Metacentre and Metacentric Height.

2 Define Stream function.

3 What is drag force ?

4 Explain Magnetic declination.

5 Define the degree of curve.

6 Convert the following quadrantal bearings into whole circle bearings :

(a) N 10° 00' E

(b) N 18° 20' W



7 Name the apparatus used for following test of cement -

- (a) Setting time
- (b) Soundness

8 Match list-I with list-II :

List-I	List-II
A - Granite	Water worm pebble
B - Sandstone	Igneous rock
C - Gneiss	Sedimentary
D - Gravel	Metamorphic

9 Explain Duty.

10 Define afflux.

11 Why is Camber provided ?

12 Differentiate between Bitumen and Tar.

13 What is unit hydrograph ?

14 Why disinfection is the most important step in water treatment ?

15 Describe the equation for Exit - gradient.

16 What is seasoning of timber ?

17 Match list-I with list-II :

List-I

- A - Grit chamber
- B - Secondary setting tank
- C - Activated sludge process
- D - Trickling filter

List-II

- Zone setting
- Stoke's law
- Aerobic
- Contact stabilisation

18 Why garric should have arch roof in gravity dam ?

19 Briefly discuss non-passing sight distance.

20 What are different methods of water softening ?

PART – B

Marks : 60

Note : Attempt all the twelve questions. Each question carries 5 marks. Answer should not exceed 50 words.

21 Define and explain briefly :

- (i) Velocity Potential and
- (ii) Stream Function

22 Define the term : Most economical section of channel. What are the conditions for trapezoidal section ?



25 What is traffic rotary ? What are its main objectives ?

26 Write down the difference between high-rate trickling filter and low-rate trickling filter.



27 Calculate the population of the year 2000 and 2006 for a city whose population in the year 1930 was 25000 and in the year 1970 was 47000. Make use of geometric increase method.

28 There are four raingauge stations existing in the catchment of a river. The average annual rainfall values at these stations are 800, 620, 400 and 540 mm respectively.

- (a) Determine the optimum number of raingauges in the catchment, if desired to limit the error in the mean value of rainfall in the catchment to 10%.
- (b) How many gages will then be required to be installed ?



29 What are the characteristics of Black Cotton Soil ? What precautions would you take in designing and laying foundations in Black Cotton Soil ?

30 A piping system consists of three pipes arranged in series, the length of the pipes are 1200 m, 750 m and 600 m and diameters 750 mm, 600 mm and 450 mm respectively,
(i) Transform the system to an equivalent 450 mm diameter pipe, and
(ii) Determine an equivalent diameter for the pipe, 2550 m long.

- 31 Calculate the stopping sight distance for design speed of 80 kmph. Take the total reaction time 2.5 seconds and coefficient of friction 0.35.

- 32 The reduced level of a factory floor is 30.00 m and the staff reading on the floor is 1.40 m. The staff reading when held inverted with the bottom touching the T-beam roof is 3.67 m. Find the height of beam above floor.

PART – C

Marks : 100

Note : Attempt any 5 questions. Each question carries 20 marks. Answer should not exceed 200 words.

33 Derive the Bernoulli's equation and state its assumptions.



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37 The offsets (in metre) taken from a chain line to a curved boundary are given below :

Chainage (m)	0	5	10	15	20	25	35	45	55	65
Offsets (m)	2.5	3.8	8.4	7.6	10.5	9.3	5.8	7.8	6.9	8.4

Find the area between chain line, first and last offset and the boundary by Simpson's Rule.

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- 38 The design speed of a highway is 80 kmph. There is a horizontal curve of radius 200 m. Calculate the super-elevation needed to maintain this speed. If the maximum super-elevation of 0.07 is not to be exceeded, calculate the maximum allowable speed on this horizontal curve. Take safe limit of transverse coefficient of friction as 0.15.



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