

CENTRAL PUBLIC WORK DEPARTMENT

DEPARTMENTAL EXAMS FOR AEE'S

SEPTEMBER 2016

Civil Engineering Paper-II

(With Books)

Time: 3 Hours

Maximum Marks: 100

Attempt all questions

- (1) Describe primary and secondary classification of Surveying. (5)
- (2) Discuss uses of leveling. What are the various points to be remembered while entering the level book. (2+3)
- (3) During a fly levelling operation, the following readings were observed (5+5)
Backsight- 0.650, 2.155, 1.405, 2.655, 2.435
Foresight- 2.455, 1.305, 0.555, 2.405
The first backsight was taken on a BM of RL 90.500m. From the last position of the instrument, four pegs at 30 m intervals are to be set out on a uniformly falling gradient of 1 in 100. Find staff readings and RLs of the pegs.
- (4) The following offsets are taken from a survey line to a curved boundary line: (5+5)

Distance (m)	0	5	10	15	20	30	40	60	80
Offset (m)	2.5	3.8	4.6	5.2	6.1	4.7	5.8	3.9	2.2

- Compute the area between the survey line, the curved boundary line, and the first and the last offsets by: (i) The trapezoidal rule (ii) The Simpson's rule
- (5) Derive the equation for super elevation. Calculate the safe driving speed on a curve with radius 200 meter, the super elevation being 0.07. If the pavement width is 7 meter, how much should the pavement edges be raised or depressed about the crown if the super elevation is provided by rotating about the centre line. (5+5)
- (6) What are the various factors affecting soil strength? Explain direct shear test with diagramme. (5+5)

- (7) Discuss various factors influencing compaction of soil. What is zero void line? (5+5)
- (8) What are various types of pavement? Calculate the deflection at the surface of a pavement due to a wheel load of 40 KN and a tyre pressure of 0.5 MN/m^2 . The value of E of the pavement and subgrade may be assumed to be uniformly equal to 20 MN/m^2 . (5+5)
- (9) Write short notes on – (5+5)
- (a) Break point chlorination
 - (b) Advantages of Pre-stressed concrete
- (10) Determine the dimension of a T-shaped retaining wall for a height of 4m above ground level. The top of the earth retained is surcharged at 20° with the horizontal. The angle of repose of the earth is 35° and its density is 19 KN/m^3 . The safe bearing capacity of the soil is 80 KN/m^2 and coefficient of friction between concrete and soil is 0.55. (10)
- (11) A simply supported pre-stressed concrete beam of cross-section $400 \times 600 \text{ mm}$ covers a span of 10m. It is subjected to a uniformly distributed load of 30 KN/M in addition to its self weight and is pre-stressed with a force of 1740 KN with a pre-stressing cable of parabolic profile. The cable is anchored at the centre of gravity of the cross-section at the support section and has a dip of 160 mm at the middle cross-section. Analyze the beam for the effects of pre-stressing and the loads at mid cross-section. Unit weight of concrete is 24 KN/M^3 . (5)
- (12) Compute the eccentricity and initial force of prestress if permissible stress at top fibre is 5 N/mm^2 (tension) and permissible stress at bottom fibre is 20 N/mm^2 (compression). The width of the section is 250 mm and depth is 300mm. (5)