

Total No. of printed pages = 3

**CE 181601**

Roll No. of candidate

12/6/23

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Azara, Hatkhowapara  
Guwahati - 781017

2023

**B.Tech. 6<sup>th</sup> Semester End-Term Examination**

**Civil Engineering**

**TRANSPORTATION ENGINEERING - II**

**(New Regulation w.e.f. 2017-18 & New Syllabus w.e.f. 2018-19)**

Full Marks - 70

Time - Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. Choose the correct answer : (10 × 1 = 10)

(i) For a BG route with M+7 sleeper density, the number of sleepers per rail length is:

- (a) 18 (b) 19  
(c) 20 (d) 21

(ii) To have good drainage of the ballast section, cross slope of the formation should be:

- (a) 1 in 30 (b) 1 in 40  
(c) 1 in 20 (d) 1 in 50

(iii) The number of dog spikes normally used per rail seat on curved track is:

- (a) One on either side  
(b) Two outside and one inside  
(c) One outside and two outside  
(d) Two outside and two inside

(iv) The number of fish-bolts in fish-plate is generally:

- (a) 2 (b) 3  
(c) 4 (d) 8

[Turn over

- (v) The cant requirement for  $2^\circ$  BG curve with an equilibrium speed of 90 kmph will be:
- (a) 65 km (b) 95 km  
(c) 120 km (d) 127 km
- (vi) The overall length of a turnout is the distance between the end of stock rail and:
- (a) heel of crossing (b) actual nose of crossing  
(c) throat of crossing (d) toe of crossing
- (vii) Minimum value of radius of curvature for airports serving jet aircraft is:
- (a) 100 m (b) 120 m  
(c) 150 m (d) 160 m
- (viii) As per ICAO recommendations the maximum longitudinal gradient along taxiway should not exceed:
- (a) 1.5% (b) 1.25%  
(c) 2% (d) 3%
- (ix) The imaginary conical surface of the approach area has a slope upward of
- (a) 1 in 20 (b) 1 in 15  
(c) 1 in 10 (d) 1 in 25
- (x) Outer horizontal surface may not be required at an airport having runway length less than:
- (a) 800 m (b) 1000 m  
(c) 1100 m (d) 900 m
2. (a) Why is it desirable to have, as far as possible, a uniform gauge for the railway network of a country? (5)
- (b) It is observed that at present tracks are mostly laid with flat-footed rails. Give reasons for this preference in relation to other types of rail sections. (5)
- (c) Mention the circumstances under which tunnel is desirable? (5)
3. (a) Write the different types of sleepers used in the track on Indian Railways. Write down in brief the advantages and disadvantages of each type. (10)
- (b) Calculate the optimum thickness of the stone ballast required below sleepers of density M+7 on a BG track. (5)
4. (a) Calculate the superelevation and maximum permissible speed for a  $2^\circ$  BG transitioned curve on a high-speed route with a maximum sanctioned speed of 110 kmph. The speed for calculating the equilibrium superelevation as decided by the chief engineer is 80 kmph. (10)
- (b) Draw a neat sketch of a left-hand turnout and name its various components. (5)

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5. (a) What is a locomotive? What do you understand by a locomotive with a nomenclature 4-6-2? (5)
- (b) Calculate the maximum permissible train load that can be pulled by a locomotive with four pairs of driving wheels with an axle load of 28.42 tonnes each on a BG track with a ruling gradient of 1 in 200 and a maximum curvature of  $3^\circ$ , travelling at a speed of 48.3 kmph. Take the coefficient of friction to be 0.2. (10)
6. (a) What type of information would you like to collect through geological investigation, before construction of tunnel? (5)
- (b) The length of a runway under standard conditions is 1500 m. the airport is to be provided at an elevation of 110 m. The airport reference temperature is  $32^\circ\text{C}$ . Following data refers to the proposed longitudinal section of runway. Determine to the corrected length of runway. (10)

End to end of runway (m)	Grade (%)
0 to 300	+1
300 to 900	-0.2
900 to 1500	+0.5
1500 to 1800	+1
1800 to 2100	-0.3

7. (a) Explain Windrose Diagram with neat sketches for any one type. (8)
- (b) Explain briefly how the pilot controls the vertical and horizontal movement of an aircraft from his cabin. (7)