USN | | | | | | | | | | 15CV552

Fifth Semester B.E. Degree Examination, July/August 2021
Railways, Harbours, Tunneling and Airports

Time: 3 hrs. | Max. Marks: 80

Note: *Answer any FIVE full questions.*

1 a. Describe the requirements of good ballast. **(08 Marks)**
   b. Explain anyone theory of creep. **(04 Marks)**
   c. Using a sleeper density of M+5, find the number of sleepers required for constructing a railway track 640M long B.G track. **(04 Marks)**

2 a. What would be the equilibrium cant on a BG curve of 5° for an average speed of 60kmph? Also find the maximum permissible speed after allowing the maximum cant deficiency. **(08 Marks)**
   b. Draw the sketch of a simple turnout and indicate the leads, radii and angles considered in its design. **(03 Marks)**
   c. Calculate the various loads of a B.G turnout for a crossing number 1 in 8.5 with a heel divergence of 115mm. **(05 Marks)**

3 a. Briefly describe the three stages in the construction of a new railway track. **(08 Marks)**
   b. Workout the quantity of rails, sleepers, fish plates, bearing plates and dog spikes required for the construction of a B.G. railway track per KM. **(08 Marks)**

4 a. With a neat sketch, explain what is a marshalling yard? Also describe the types of marshalling yard. **(08 Marks)**
   b. Explain the major infrastructure needed for a metro rail transportation system for a city. **(08 Marks)**

5 a. What are the important component parts of a harbour? List the principles followed in planning of a harbour. **(08 Marks)**
   b. Write an explanatory note on the types and classification of harbours. **(08 Marks)**

6 a. With neat sketch, explain the step by step procedure adopted in needle beam method of tunneling in soil. **(08 Marks)**
   b. Indicate the suitability, advantages and disadvantages of commonly used materials for tunnel lining. **(08 Marks)**

7 a. List the major advantages of air transportation system. **(04 Marks)**
   b. Indicate the airport classification as per ICAO based on running length. **(04 Marks)**
   c. Explain the factors considered in selection of a new airport site. **(08 Marks)**

8 a. What is airport planning? Describe the objectives and constants of an airport master plan. **(08 Marks)**
   b. Describe the importance of vehicular circulation and parking area in an airport. Also indicate with sketches, the usual types of vehicular parking system followed in an airport. **(08 Marks)**

9 a. With a neat sketch, explain the procedure for runway orientation using Type II windrose diagram. **(08 Marks)**

   b. The mean of maximum and average daily temperatures of an airport site are 9° and 24°C. A runway of basic length 2500m is to be located just a few meters above MSL and the proposed longitudinal gradients are 0 to 600m, +0.5%, 600 to 1100m, -0.3%, 1100 to 1900m, +0.6%, 1900 to other end, +0.2%. Determine the corrected runway length. **(08 Marks)**

10 a. List the factors considered in geometric design of runway. Indicate the ICAO standards for these factors. **(08 Marks)**

   b. Design the radius of turning taxiway for a supersonic aircrafts using the following data:
   Wheel base = 36m
   Tread of main gear = 7.0m
   The distance between landing gear and edge of taxiway pavement = 6.0m
   Turning radius = 64kmph. **(08 Marks)**

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