

Paper Id: Roll No. 

**B.TECH.**  
**(SEM VII) THEORY EXAMINATION 2023-24**  
**RAILWAY, WATERWAY AND AIRWAY ENGINEERING**

*Time: 3 Hours**Total Marks: 100***Note:** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A****1. Attempt all questions in brief. 2 x 10 = 20**

- (a) What are the requirements of permanent way formation?
- (b) Why is it advisable to have narrow railway gauge in mountainous country?
- (c) List the merits of electric traction.
- (d) When would you recommended 'Pusher gradient' in railway tracks?
- (e) What is the purpose of providing wing walls?
- (f) What do you mean by crossing clearance?
- (g) Discuss the term interlocking.
- (h) Why is landing and take-off operations performed along head wings?
- (i) How can you determine the air craft capacity?
- (j) Define semi natural harbours.

**SECTION B****2. Attempt any three of the following: 10 x 3 = 30**

- (a) Discuss the organizational structure of Indian Railways.
- (b) Explain necessity of gradient. Discuss all types of gradients giving their permissible values adopted in Indian Railways.
- (c) Calculate the super elevation, maximum permissible speed and transit length for a 3° curve on a high-speed BG section with maximum sanctioned speed of 110 km/hr. Assume equilibrium speed to be 80 kmph and the booked speed of train to be 50 kmph.
- (d) What is meant by the basic runway length? Discuss the three cases to be considered with neat sketch.
- (e) What is sounding? Explain the methods for taking sounding on a ship in brief.

**SECTION C****3. Attempt any one part of the following: 10 x 1 = 10**

- (a) Draw the typical cross section of a double line permanent way (BG) on embankment and show the various components.
- (b) Explain the various types of spikes with neat sketches and give requirements of good spike.

**4. Attempt any one part of the following: 10 x 1 = 10**

- (a) How the maximum permissible speed of the train is determined on a curved railway track in India?
- (b) Derive the relationship of super elevation with gauge, speed and radius of curvature.

5. Attempt any *one* part of the following: 10 x 1 = 10

- (a) Briefly describe the absolute block system of controlling the movements of trains for single and double lines. Also give its merits.
- (b) What are the important limitations in attaining high speeds? Discuss

6. Attempt any *one* part of the following: 10 x 1 = 10

- (a) An airport site at sea level with standard atmospheric conditions, the runway length required for takeoff and landing are 2000 m and 2400 m respectively. The proposed airport situated at an altitude of 150 m. If the airport reference temperature is 25° C and if the effective runway gradient is 0.35%, Calculate the length of runway to be provided.
- (b) What are the various service equipment used at airport? Discuss

7. Attempt any *one* part of the following: 10 x 1 = 10

- (a) Give a brief account of any four coastal structures with neat sketches and state their locations.
- (b) Explain with neat sketches (i) Sea Walls (ii) Riprap

Model Paper, Amit Singh