



- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Assume suitable data whenever necessary.
  9. Illustrate your answers whenever necessary with the help of neat sketches.
  10. Use of non programmable calculator is permitted.

1. a) What do you understand by "Permanent Way"? 7  
Discuss the requirements of ideal permanent way.
- b) A locomotive on M.G. Track has a three pairs of driving wheels each carrying 17.27 tonne. What maximum load can it draw on a level track with a curvature of  $2^\circ$  at a speed of 48.3 Kmph. What speed can be attained by a train, carrying the same load on an upgradient of 1 in 250? 6

**OR**

2. a) What are the possible causes of creep? Discuss in brief comment on prevention of creep. 6
- b) What is mean by coning of wheel? Explain. 7
3. a) What are the objectives of providing ballast in the permanent way. Also discuss the various types of ballast. 6
- b) A 6 degrees curve branches off from a 3 degrees main curve in an opposite direction in the layout of a B.G. Yard. If the speed on branch line is limited to 35kmph, determine the speed restriction on the main line. 7

**OR**

4. a) On a B. G. 3 degree curve, "The equilibrium cant" is provided for a speed of 70kmph. 7  
a) Calculate the value of the equilibrium cant.  
b) Allowing a maximum cant deficiency, what would be the maximum permissible speed on the track.
- b) Write short notes on **any two**. 6
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|----------------------|--------------------------|
| i) LWR               | ii) Rail failures        |
| iii) Sleeper density | iv) Fishplate & Fishbolt |
5. a) Draw the neat sketches of various types of crossings in use on Indian railways. Explain in brief. 7
- b) Discuss the marshalling yard & its types. 7

**OR**

6. Write notes on **any three**. 14
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|--------------------|----------------------|
| i) Heel divergence | ii) Throw of switch  |
| iii) Tongue rail   | iv) Semaphore signal |
| v) Repeater signal | vi) Warner signal    |

7. a) Calculate the actual runway length required if the new airport is to be developed at a site having following details. 8
- i) Elevation = 1400m.
  - ii) ART = 37°C.
  - iii) Baric Runway length = 2500m.
  - iv) Effective gradient = 0.38%.
- Check the correction as per the ICAO aircraft.
- b) Define the terms: 6
- |                          |                    |
|--------------------------|--------------------|
| i) Cross-Wind component. | ii) Wind coverage. |
|--------------------------|--------------------|

**OR**

8. a) Enumerate the various factors which are to be considered while selecting a suitable site for an airport. Explain in brief. 7
- b) Discuss the characteristics of an aircraft that influences the planning & design of airport facilities. 7
9. a) What do you understand by terminal area? What facilities are provided in this area? 7
- b) Write short notes on: 6
- |                       |                      |
|-----------------------|----------------------|
| i) Approach lighting. | ii) Runway markings. |
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**OR**

10. a) Explain in brief with neat sketch the "I.L.S system". 7
- b) What is ATC? What En-route aids are provided though A.T.C. 6
11. a) Write notes on **any three**. 13
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|--------------------------|-----------------------------|
| i) Tunnel lining         | ii) Drainage in Tunnels.    |
| iii) Lighting in tunnels | iv) Economics of Tunneling. |

**OR**

12. a) What are the ways in which the ventilation can be provided in the tunnel? Explain. 6
- b) Write in detail tunnel surveying. 7

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