

B.TECH/ CE/6TH SEM/CIVL 3231/2018
RAILWAY AND AIRPORT ENGINEERING
(CIVL 3231)

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.*

*Candidates are required to give answer in their own words as far as
practicable.*

Group - A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) Broad gauge has a gauge width of
(a) 1.576m (b) 1.676m (c) 1.776m (d) 1.876m.
- (ii) Gauge is
(a) distance between c/c of rails
(b) width of ballast
(c) distance between outer face of rails
(d) distance between inner face of rails.
- (iii) The maximum limit of superelevation recommended by Indian Railways on BG is
(a) 165.1 mm (b) 101.6mm (c) 83.2 mm (d) 76mm
- (iv) As per ICAO, the basic runway width for A type airport is
(a) 45 m (b) 42.5 m (c) 30 m (d) 22.5 m.
- (v) As per ICAO, maximum longitudinal grade for B type airport is
(a) 0.5% (b) 1.0% (c) 1.5% (d) 2.0%.
- (vi) The main function of fish plate is to
(a) join the two rails together
(b) join rail with the sleeper
(c) allow rail to expand and contract freely
(d) hold the pandrol clip.
- (vii) Grade compensation per degree of curve of BG track is
(a) 0.02 % (b) 0.03% (c) 0.04% (d) 0.05%.

B.TECH/ CE/6TH SEM/CIVL 3231/2018

- (viii) According to ICAO, all the marking on the runway are
(a) red (b) black (c) white (d) yellow
- (ix) The runway length as recommended by ICAO is based on which of the following conditions?
(a) Airport altitude is at sea level
(b) Temperature at the airport is 25°C
(c) Runway gradient is 0.2%
(d) Aircraft is not loaded.
- (x) The runway of type B as per ICAO classification, is made for aircrafts having wing span between
(a) 15 m and 24 m (b) 24 m and 36 m
(c) 36 m and 52 m (d) 52 m and 65 m.

Group - B

2. (a) What are the different forms of railways for urban transportation? Write down the advantages of rail transport over road transport.
(b) What is permanent way? Draw a typical cross-section of permanent way on embankment.
(2 + 4) + 6 = 12
3. (a) What are the advantages of ballast-less track?
(b) What are the elastic fastenings used with concrete sleepers?
(c) Calculate the superelevation and maximum permissible speed for 3rd curve on a high speed BG section with a maximum sanctioned speed of 110 kmph. Assume the equilibrium speed to be 80 kmph and the booked speed of the goods train to be 50 kmph.
3 + 2 + 7 = 12

Group - C

4. (a) Calculate the maximum permissible load that a BG locomotive with three pairs of driving wheels bearing an axle load of 22 tonnes each can pull on a straight level track at a speed of 80 kmph. Also calculate the reduction in speed if the train has to run on a rising gradient of 1 in 200. What would be the further reduction in speed if the train has to negotiate a 4th curve on the rising gradient? Assume coefficient of friction to be 0.2.
(b) What is "throw of switch"? Draw a neat sketch of crossover between parallel tracks.
8 + 4 = 12

5. (a) What are the advantages of automatic signalling?
- (b) Write short note on interlocking.
- (c) Write down the technologies that have to be developed in railway tracks for high-speed trains.

5+ 3+ 4 = 12

Group - D

6. (a) Write down the effects of "size of aircraft" and "minimum turning radius" of aircraft on airport planning.
- (b) What is the need of implementing zoning laws? Write short note on approach zone.

6 + 6= 12

7. (a) The length of runway under standard condition is 1620 m. The airport site has an elevation of 270 m. Its reference temperature is 32.94^o C. If the runway is to be constructed with the effective gradient of 0.20%, determine the corrected runway length.
- (b) What is the function of taxiway? What are the considerations that decide the layout of taxiway?

8 + (1 + 3) = 12

Group - E

8. (a) What is the function of a hangar? What are the factors that should be considered while designing a hangar?
- (b) Write down the function of "approach lighting" on a runway.
- (c) Write down the objectives of surface drainage design in an airport.

(2+2) +4 + 4 = 12

9. (a) What is gate position? Describe the factors on which the size of gate position depends.
- (b) Write down the design considerations applied to taxiway lighting. Draw a neat sketch.
- (c) Write down the special characteristics of airport drainage.

(1+3) + 4 + 4 = 12