

**RAILWAY & 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) 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.
- (ii) The weight of rail considered for BG tracks are
(a) 30MR (b) 40MR (c) 50MR (d) 60 MR.
- (iii) The maximum gradient for BG track in station yard is
(a) 1 in 1000 (b) 1 in 400 (c) 1 in 200 (d) 1 in 100
- (iv) Maximum cant deficiency for Indian Railways for M.G track
(a) 25 mm (b) 50 mm (c) 75 mm (d) 100 mm
- (v) For a sleeper density of $(n+6)$ in metric units, the number of sleeper required for construction of B.G track of length 1.026 km
(a) 1520 (b) 1630 (c) 1720 (d) 1800.
- (vi) Pick up the incorrect statement from the following
(a) In double engine aeroplanes, one engine on either wing is placed symmetrically
(b) In single engine aeroplanes, the engine is provided in the nose of the aircraft
(c) In three engine aeroplanes, two engines are placed on both wings and one engine is placed in the tail
(d) None of these.
- (vii) The fuselage includes
(a) pilot's cabin (b) tail of aircraft
(c) passengers chamber (d) All of these.

B.TECH/CE/6TH SEM/CIVL 3231 (BACKLOG)/2021

- (vii) Wing loading of an aircraft is
- (a) The ratio of gross total weight of aircraft to load of wing
 - (b) The ratio of gross total weight of aircraft to wing area
 - (c) The ratio of gross total weight of aircraft to power of wing engine
 - (d) Load on wing.
- (ix) The meteorological condition which influences the size and location of an airport is
- (a) Reduced level
 - (b) Atmosphere pressure
 - (c) Wind direction
 - (d) All of these.
- (x) The runway orientation is made so that landing and takeoff are
- (a) Perpendicular to wind direction
 - (b) Against the wind direction
 - (c) Along the wind direction
 - (d) None of these.

Group - B

2. (a) Write short note on
- (i) Vignoles rail
 - (ii) Sleeper density.
- (b) Write down the theory of creep with neat sketch.
- (c) Establish the relationship between Superelevation with gauge, speed and radius of the curve in railway.
- (2 + 2) + 4 + 4 = 12**

3. (a) What are the advantages of ballastless track?
- (b) Write short note on gradient of railway track.
- (c) A 6 degree curve diverges from a 3 degree main curve in reverse direction in the layout of a B.G. yard. If the speed on the branch line is restricted to 45 km.p.h., Determine the restricted speed on the main line.
- 2 + 2 + 8 = 12**

Group - C

4. (a) Calculate all the elements required to set out a 1 in 12 turnout taking off from a straight BG track with its curve starting from the toe of the switch i.e., tangential to the gauge face of the outer main rail and passes through theoretical nose of crossing (T.N.C), given that the heel divergence as 114 mm .
- (b) What is "throw of switch"?
- (c) Write down the types of platforms in railway station.
- 8 + 2 + 2 = 12**
5. (a) Write a short note on negative superelevation.

- (b) Write down the geometric requirements of high-speed track.
- (c) What is track circuiting? Write down the principle of track circuiting.

3 + 5 + 4 = 12**Group - D**

6. (a) What are the important aircraft characteristics that are required for airport planning and design.
- (b) Write short note on clear zone.
- (c) The monthly mean temperatures of the atmosphere, at a particular site, where an airport has to be developed, are given below. Determine the airport reference temperatures. If the basic length of runway is 1800 m under standard conditions and the airport site has an elevation of 100 m above mean sea level, determine the actual runway length to be provided. The runway is assumed to be level.

Month	Temperature ° C	
	Mean value of average daily	Mean value of maximum daily
January	8	15
February	18	24
March	25	33
April	30	40
May	33	44
June	38	48
July	32	43
August	30	38
September	26	35
October	24	30
November	19	25
December	10	17

3 + 3 + 6 = 12

7. (a) Discuss about the basic patterns of runway.
- (b) Determine the best runway orientation if an airport with two runways is to be designed using the average wind data for last 10 years that is given in the table below. Also calculate the wind coverage.

Direction	Percentage of time with wind velocity in kmph		
	6.4– 25	25– 50	50– 75
N	0.40	1.40	0.20
NNE	2.00	4.20	0.30
NE	5.00	8.00	0.30
EEN	2.20	1.40	0.10

B.TECH/CE/6TH SEM/CIVL 3231 (BACKLOG)/2021

E	0.50	0.70	0.10
EES	2.50	0.90	0.00
SE	4.00	3.40	0.30
SSE	2.90	2.50	0.20
S	1.60	1.40	0.00
SSW	2.30	2.20	0.10
SW	3.30	2.60	0.10
WWS	5.80	5.00	0.20
W	2.40	1.30	0.10
WWN	2.60	1.40	0.00
NW	3.60	2.50	0.10
NNW	1.60	0.60	0.00

4 + 8 = 12**Group - E**

8. (a) Write short notes on following aircraft parking system (show necessary diagrams)
(i) Open apron system, (ii) Finger system.
- (b) Briefly discuss about runway lighting.
- (c) What are the different types of airport marking?

(3 + 3) + 4 + 2 = 12

9. (a) Explain the need for terminal area.
- (b) What are the design objectives of surface drainage?
- (c) Write short notes on
(i) Approach lighting, (ii) Threshold Lighting.

3 + 3 + (3 + 3) = 12

Department & Section	Google classroom joining code	Submission Link
CE	wmw3qop	https://classroom.google.com/u/0/w/MzY0NTU3ODE5Nzg1/tc/MzY0NTY1ODk2NTU1