AIRPORT, RAILWAY AND HARBOUR ENGINEERING
(CIVL 4143)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) Which of the following type of sleepers has the least service life?
(a) Cast Iron sleepers (b) Steel sleepers
(c) Concrete sleepers (d) Wooden sleepers.

(ii) Which of the following is the most used ballast on Indian railways?
(a) Sand ballast (b) Broken stone ballast
(c) Brickbat ballast (d) Coal ash ballast.

(iii) Maximum value of superelevation according to Railway for BG Track is
(a) 1/12th of Gauge (b) 1/11th of Gauge
(c) 1/10th of Gauge (d) 1/20th of Gauge.

(iv) What is it called when a vehicle traverses on the switch from its thick end to thin end?
(a) Right hand turnout (b) Left hand turnout
(c) Facing direction (d) Trailing direction.

(v) What is done to ensure that at the wheel negotiates the gap of crossing properly?
(a) The wheel is widened (b) Speed of train is increased
(c) A check rail is provided (d) Material can be filled.

(vi) Wind Rose diagram is used to represent which of the following?
(a) Duration of winds only
(b) Flows between central places and dependent places
(c) Wind directions and durations
(d) Directions of wind only.

(vii) The runway length is increased on every rise of 300m from MSL for designing of airport by
(a) 4% (b) 6% (c) 7% (d) 10%.

(viii) What is the purpose of a "hold short" line on the taxiway?
(a) To indicate the end of the taxiway
(b) To alert the pilot to stop before entering the runway
(c) To mark the taxiway edge
(d) To show the entrance to the terminal.

(ix) What is the purpose of the chevrons marked on the displaced threshold of a runway?
(a) To indicate the end of the usable runway
(b) To indicate an area for taxiing
(c) To mark an area unsuitable for landing, takeoff, or taxiing
(d) To indicate a restricted area.

(x) What type of drainage system is commonly used in airport runways and taxiways?
(a) Open channel drainage (b) French drains
(c) Trench drains (d) Surface runoff systems.

Fill in the blanks with the correct word

(xi) Maximum permissible_____ degree of curves on BG Track.

(xii) The primary function of an airport terminal building is to facilitate the movement of _____ and baggage.

(xiii) Taxiways are used to connect the _____ to the runway and other parts of the airport.

(xiv) Ballast helps to distribute the _____ from the tracks to the underlying foundation evenly.

(xv) The spacing between railway sleepers is called the sleeper _____ and it affects track strength and stability.

Group - B

2. (a) Explain the necessity of sleepers in railway track. What are the requirements of good sleepers in railway track? *[(CO3)(Evaluate/HOCQ)]*
(b) What are the advantages and disadvantages of concrete sleepers? *[(CO2)(Remember/LOCQ)]*
(c) What do you mean by composite sleeper index (C.S.I)? *[(CO1)(Remember/LOCQ)]*

(3 + 3) + 4 + 2 = 12

3. (a) Explain the necessity of gradients in a railway track. Discuss all the types of gradients giving their permissible values adopted on Indian Railways. *[(CO3)(Evaluate/HOCQ)]*
(b) Explain the necessity of grade compensation at curves. *[(CO4)(Remember/LOCQ)]*
(c) If the ruling gradient is 1 in 150 on a particular section of broad gauge and at the same time a curve of 4° is situated on this ruling gradient, what should be the allowable ruling gradient? *[(CO2)(Analyse/IOCQ)]*

(2 + 4) + 2 + 4 = 12

Group - C

4. (a) Draw a neat sketch of simple left hand turnout and show its various component parts. *[(CO3)(Create/HOCQ)]*
   (b) Explain the working principle of turnout. *[(CO2)(Remember/LOCQ)]*
   (c) Write short notes on stub switch and split switch. *[(CO2)(Remember /LOCQ)]*

6 + 2 + 4 = 12

5. (a) What are the objects of signalling in railways? *[(CO3)(Remember/LOCQ)]*
   (b) Describe the engineering principles of signalling in railways. *[(CO2)(Analyse/IOCQ)]*
   (c) With the help of a schematic diagram show the different types of signals. *[(CO2)(Create/HOCQ)]*

4 + 4 + 4 = 12

Group - D

6. (a) Define the following terms: (i) Taxiway, (ii) Hangar and (iii) Apron. *[(CO5)(Analyse/IOCQ)]*
   (b) Write a note on categorisation of airports by FAA. *[(CO4)(Remember/LOCQ)]*

(2 × 3) + 6 = 12

7. (a) Define the following components of a runway: (i) Runway thresholds, (ii) Clearway, (iii) Stop way. *[(CO5)(Understand/LOCQ)]*
   (b) Draw a neat sketch to show the cross-sectional details of runway. *[(CO4)(Create/HOCQ)]*

(2 × 3) + 6 = 12

Group - E

8. (a) Enumerate the factors that should be considered for the design of durable and water resistant runway pavements. *[(CO5)(Remember/LOCQ)]*
   (b) Define poor drainage conditions and mud pumping in airport rigid pavements. *[(CO4)(Remember/LOCQ)]*

6 + 6 = 12

9. (a) Explain the suitability of different types of inlets. *[(CO4)(Analyse/HOCQ)]*
   (b) State and draw the different types of gutter channels. *[(CO4)(Create/HOCQ)]*

6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	43.75	14.58	41.67