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 is not a component of rail?
(a) Ballast (b) Foot
(c) Web (d) Head.

(ii) Which of the following rail has been standardized for adoption in Indian railways?
(a) Combination of BH and DH (b) Flat footed
(c) Double headed (d) Bull headed.

(iii) The limiting value of cant gradient for all gauges is
(a) 1 in 360 (b) 1 in 720
(c) 1 in 1000 (d) 1 in 1200.

(iv) The type of spike used for fixing chairs of bull headed rails to wooden sleepers is
(a) Dog spike (b) Rail screw
(c) Elastic spike (d) Round spike.

(v) The main function of a fish plate is
(a) To join the two rails together
(b) To join rails with the sleepers
(c) To allow rail to expand and contract freely
(d) None of the above.

(vi) The depressions and undulations in pavements are caused due to
(a) Improper compaction of sub-grade (b) Impact of heavy wheel loads
(c) Punching effect (d) All of (a), (b) & (c).

(vii) The station where a branch line joins a main line is called
(a) Terminal station (b) Block station
(c) Non- block station (d) Junction station.

(viii) According to ICAO all markings on the runways are painted on white and on taxiways
(a) Black (b) Red
(c) Yellow (d) Green.

(ix) The runway orientation is made so that landing and take-off are
(a) Along the wind direction (b) Against the wind direction
(c) Perpendicular to wind direction (d) None of (a), (b) & (c).

(x) Airport elevation is the reduced level above M.S.L of
(a) Control tower (b) Highest point of the landing area
(c) Lowest point of the landing area (d) None of (a), (b) & (c).

Fill in the blanks with the correct word

(xi) The minimum width of clearway is _____.

(xii) The shape of transition curve used by Indian railways is _____.

(xiii) Yellow light hand signal indicates _____.

(xiv) Effective length of runway is the distance between _____.

(xv) Wing loading of an aircraft is _____.

Group - B

2. (a) Draw a neat sketch of the cross-section of a Permanent Way on embankment. *[(CO3)(Create/HOCQ)]*

(b) What are the requirements of an ideal Permanent Way? *[(CO1)(Understand/LOCQ)]*

6 + 6 = 12

3. (a) If the ruling gradient is 1 in 150 on a particular section of Broad Gauge and at the same time a curve of 4 degree is situated on this ruling gradient, what should be the allowable ruling gradient? [Grade compensation of B.G. is 0.04% per degree of curve.] *[(CO3)(Analyse/IOCQ)]*

(b) What do you mean by the term "cant" in railway engineering? What is cant deficiency? *[(CO2)(Understand/LOCQ)]*

8 + 2 + 2 = 12

Group - C

4. (a) What are the necessities of Points and crossings in railway engineering? *[(CO1)(Understand/LOCQ)]*

(b) Explain the following terms: (i) Facing Direction, (ii) Trailing Direction, (iii) Trailing Points of turnouts. *[(CO1)(Remember/LOCQ)]*

(c) Name the component parts of Crossing. *[(CO1)(Apply/LOCQ)]*

4 + 6 + 2 = 12

5. (a) Explain with a schematic diagram about the different types of signals that are in use in railway engineering. *[(CO1)(Create/HOCQ)]*

(b) Explain the following: (i) Passenger Bogie Yards, (ii) Goods Yards, (iii) Loops.
[(CO2)(Remember/LOCQ)]

6 + (2 + 2 + 2) = 12

Group - D

6. (a) What is the full form of ICAO? Write a short note on classification of aerodromes by ICAO. *[(CO4)(Remember/LOCQ)]*

(b) What are the factors that affect the length of runway as per ICAO 2006?
[(CO4)(Remember/LOCQ)]

(2 + 4) + 6 = 12

7. (a) Draw a neat sketch of the cross-sectional details of Taxiway. *[(CO5)(Create/HOCQ)]*

(b) Write about the possible repairs to treat deformations of asphalt airport pavement layers. *[(CO4)(Remember/LOCQ)]*

6 + 6 = 12

Group - E

9. (a) Describe the different components of a terminal building in an airport.
[(CO4)(Remember/LOCQ)]

(b) What are the requirements of airport drainage? *[(CO6)(Remember/LOCQ)]*

(c) Write short notes on: (i) Air Traffic Control, (ii) Approach Lighting System.
[(CO6)(Remember/LOCQ)]

4 + 2 + (3 + 3) = 12

9. (a) Briefly explain the functions of runway markings with a neat sketch.
[(CO6)(Analyse/IOCQ)]

(b) Explain the following terms:
(i) Runway Light Fixtures, (ii) Apron Lights, (iii) Airport Signs.
[(CO6) (Remember/LOCQ)]

6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	60.42	20.83	18.75

Course Outcome (CO):

After the completion of the course students will be able to

1. Understand the importance of railway infrastructure, planning and design
2. Identify the factors governing the design.
3. Design and analyze the railway track system.
4. Get an idea about air transport (brief idea), different air transport organizations, components of aircraft and their influences on airport, airport planning and obstruction.
5. Analyze wind for runway orientation and design runways as well as taxiways.
6. Have a brief knowledge of terminal area, airport layout, drainage, marking and lighting.

**LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.*