CLASS TEST

S.No. : 02 IGCE_G_23042024

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CIVIL ENGINEERING

Railway

Duration : 1:00 hr. **Maximum Marks : 50**

Read the following instructions carefully

1. This question paper contains **25** objective questions. **Q.1-25 carry two** marks each.
2. Answer all the questions.
3. Questions must be answered on Objective Response Sheet (ORS) by darkening the appropriate bubble (marked A, B, C, D) using HB pencil against the question number. Each question has only one correct answer. In case you wish to change an answer, erase the old answer completely using a good soft eraser.
4. There will be NEGATIVE marking. For each wrong answer 1/3rd of the full marks of the question will be deducted. More than one answer marked against a question will be deemed as an incorrect response and will be negatively marked.
5. Write your name & Roll No. at the specified locations on the right half of the ORS.
6. Using HB pencil, darken the appropriate bubble under each digit of your registration number.
7. No charts or tables will be provided in the examination hall.
8. Use the blank pages given for rough work.
9. Choose the Closest numerical answer among the choices given.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

Q.1 For a sleeper density of $(n + 5)$, the number of sleepers required for constructing a broad gauge (BG) railway track of length 800 m, is
(a) 918 (b) 1192
(c) 1024 (d) 1125

Q.2 What would be the admissible gradient for a BG track when 4° curve is provided with ruling gradient of 1 in 250?
(a) 0.24% (b) 0.30%
(c) 0.34% (d) 0.38%

Q.3 Wooden sleepers are used in track laying with sleepers density as $n + 7$, the width of sleeper being 25 cm. The minimum depth of ballast required is
(a) 30 cm (b) 25 cm
(c) 40 cm (d) 20 cm

Q.4 Rolling resistance of a wheel depends upon
1. Vehicle load
2. Grade
3. Ground conditions

Of these,
(a) Only 3 is correct
(b) 1 and 2 are correct
(c) 1 and 3 are correct
(d) 2 and 3 are correct

Q.5 Which one of the following types of transition curves is mostly used in Indian Railways?
(a) Euler's spiral
(b) Cubic spiral
(c) Lemniscate
(d) Cubic parabola

Q.6 The distance between the adjacent faces of stock rail and tongue rail is known as _____
(a) Flangeway clearance
(b) Flangeway depth
(c) Heel divergence
(d) Heel clearance

Q.7 Which of the following statements are correct?
1. Coning of wheels in railway coaches and wagons reduces wear and tear of the wheels.
2. The wheels are tilted at an angle of 1 in 20 to reduce the wear and tear on the rails as well as on the tread of the wheels.
3. Pandrol clips are elastic fasteners.

Select the correct answer using the codes given below:
(a) 1 and 2
(b) 2 and 3
(c) 1 and 3
(d) 1, 2 and 3

Q.8 A cross-over of 1 in 16 exists between two broad gauge parallel tracks with centres 7.5 m apart. The length of the intermediate straight portion of crossover:
(a) 66.31 m
(b) 55.10 m
(c) 35.15 m
(d) 12.20 m
(Use G = 1676 mm)

Q.9 A locomotive designated by 2-6-2, is to haul a train at a speed of 100 kmph when load of each axle is 20t. The maximum load that the locomotive can pull on a straight and level track is
[Take $\mu = 0.20$]
(a) 86.8 tonnes
(b) 624 tonnes
(c) 769 tonnes
(d) 814 tonnes

Q.10 In a split, for the maximum speed of 45 km on the main line of a BG track, the required cant is 7.78 cm. If the cant deficiency allowed is 7.5 cm, then the actual cant to be provided on the branch line will be
(a) +0.18 cm
(b) –0.18 cm
(c) +0.28 cm
(d) –0.28 cm

Q.11 The ends of a 4° circular curve are to be joined with the straights, using a transitions curve of 150 m length. The radius of curvature of the curve will be about
(a) 438 m (b) 286 m
(c) 143 m (d) 586 m

Q.12 Radius of taxiway, R as per Horonjeff approach can be calculated as

(a) $R = \dfrac{0.388T^2}{\dfrac{W}{2} - \left(6 + \dfrac{\text{Tread of landing gear}}{2}\right)}$

(b) $R = \dfrac{0.388W}{\dfrac{T^2}{2} - \left(6 + \dfrac{\text{Tread of landing gear}}{2}\right)}$

(c) $R = \dfrac{0.388W^2}{\dfrac{T}{2} - \left(6 + \dfrac{\text{Tread of landing gear}}{2}\right)}$

(d) $R = \dfrac{0.388W^2}{\dfrac{T}{2} + \left(6 - \dfrac{\text{Tread of landing gear}}{2}\right)}$

Q.13 On a broad gauge 3° track, the equilibrium cant is provided for a speed of 70 kmph. The value of maximum allowable sped after allowing the maximum cant deficiency is _____ kmph.
(Assume 20 m chain length and cant deficiency as 7.6 cm.)
(a) 81.74 (b) 84.21
(c) 97.88 (d) 77.20

Q.14 Following movement of trains has been observed on a railway track:
5 trains of 60 kmph
8 trains of 80 kmph
12 trains of 90 kmph
6 trains of 110 kmph
Railway Board's sanctioned maximum speed on track is 130 kmph. Calculate maximum permissible speed on horizontal curved railway track of 2°. (Use G = 1750 mm and arc length = 30.5 m)
(a) 131 kmph (b) 136 kmph
(c) 118 kmph (d) 123 kmph

Q.15 After application of temperature corrections, basic runway length of 1800 m is increased by 28%. Calculate elevation of airport if ART is 15°C more than SAT.
(a) 968.5 m (b) 288.5 m
(c) 112.5 m (d) 484.5 m

Q.16 Match **List-I** (Rail) with **List-II** (Use) and select the correct answer using the codes given below the lists :
List-I
A. Stock Rail
B. Tongue Rail
C. Wing Rail
D Guard Rail
List-II
1. Extra rail to prevent derailment
2. Rail for channelizing the wheel
3. Main rail to which tongue rail fits
4. Tapered rail with toe at the end and heel at the other end
Codes:

	A	B	C	D
(a)	1	4	2	3
(b)	3	4	2	1
(c)	1	2	4	3
(d)	3	2	4	1

Q.17 Find out the breathing length required for a BG track for the data given: cross-section area, A = 60 cm^2, coefficient of thermal expansion, $\alpha = 2.0 \times 10^{-5}$/°C, modulus of elasticity, $E = 20 \times 10^5$ kg/cm^2 and temperature, T = 30°C.
[Assume 350 kg as resistance of sleeper, if placed at 30 cm spacing]
(a) 123 m (b) 61 m
(c) 78 m (d) 156 m

Q.18 What will be the length of a transition curve for a BG railway curved track having 4° deflection and a 'cant' of 12 cm? (The maximum design speed on the curve is 100 kmph and cant deficiency is 7.5 cm.)
(a) 86.4 m (b) 87.6 m
(c) 92.5 m (d) 98.1 m

Q.19 A train having 20 wagons, weighing 18 t each is to run at a speed of 50 kmph. The weight of locomotive is 120 t. The train resistance due to starting will be
(a) 18 t (b) 54.6 t
(c) 19.8 t (d) 28 t

Q.20 Consider a three throw switch and match the code given below:

List-I	List-II
A. Check rail	1. 3
B. Wing Rail	2. 4
C. Switches	3. 6
D. Crossings	4. 2

Codes:

	A	B	C	D
(a)	4	3	1	2
(b)	2	3	4	1
(c)	2	4	3	1
(d)	4	2	1	3

Q.21 The correct relation between curve lead (CL), switch lead (SL) and lead of crossing (L) is given by

(a) $CL = L - SL$ (b) $L = CL - SL$

(c) $SL = L + CL$ (d) $L = \frac{1}{2}(CL + SL)$

Q.22 In the layout of an MG track, the versine of a horizontal circular curve is measured over a 11.8 m chord length. What would be the radius of the curve if the value of the versine was 2 cm?

(a) 900 m (b) 800 m

(c) 870 m (d) 850 m

Q.23 On railway tracks, corrugations normally occur on stretches where

(a) trains stop or start

(b) steel sleepers are used

(c) there are horizontal curves

(d) there are vertical curves

Q.24 **Assertion (A):** Cant deficiency is a phenomenon, when a train travels around a curve at a speed higher than the equilibrium speed.

Reason (R): Cant deficiency is the difference between the equilibrium cant and the theoretical required cant.

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not a correct explanation of A

(c) A is true but R is false

(d) A is false but R is true

Q.25 The number of gate required to serve acceptance rate of runway as 720 air craft per day if occupancy time is 50 minutes is nearly ____.

(a) 6 (b) 18

(c) 13 (d) 38

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