2020

RANK Improvement WORKBOOK

Answer key and Hint of Objective & Conventional *Questions*

Civil Engineering

Highway Engineering

MADE EASY Publications

1 Highway Geometric Design

LEVEL 1 Objective Questions

1. (720)
2. (a)
3. (c)
4. (c)
5. (c)
6. (d)
7. (d)
8. (d)
9. (b)
10. (b)
11. (b)
12. (a)

LEVEL 2 Objective Questions

13. (80.11)
14. (b)
15. (b)
16. (d)
17. (b)
18. (432.70)
19. (a)
20. (a)
21. (a)
22. (a)
23. (26.8)
24. (c)
25. (d)
26. (d)
27. (d)

LEVEL 3 Conventional Questions

Solution : 1

Total stopping sight distance = 110.29 m

Solution : 3

Length of transition curve = 70.32 m

Solution : 4

Length of valley curve = 200 m

Lowest point is situated at a distance of 104.44 mm from starting point.

Solution : 6

(a) Stopping sight distance = 281.82 m

(b) Overtaking sight distance = 394 m

Solution : 7

Chainage at the beginning of second transition curve = 96.4 + 6.77 = 103.17 chains

Solution : 8

Safe operating speed = 75.70 kmph

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2 Traffic Engineering

LEVEL 1 Objective Questions

1. (0.1353)
2. (c)
3. (b)
4. (a)
5. (d)
6. (d)
7. (d)
8. (a)
9. (c)
10. (c)
11. (b)
12. (c)
13. (c)
14. (a)
15. (a)

LEVEL 2 Objective Questions

16. (a)
17. (b)
18. (d)
19. (a)
20. (d)
21. (b)
22. (d)
24. (a)
25. (a)
26. (c)
27. (22402.137)
28. (b)
29. (c)
30. (b)

LEVEL 3 Conventional Questions

Solution : 1

$N \approx 3$ lanes

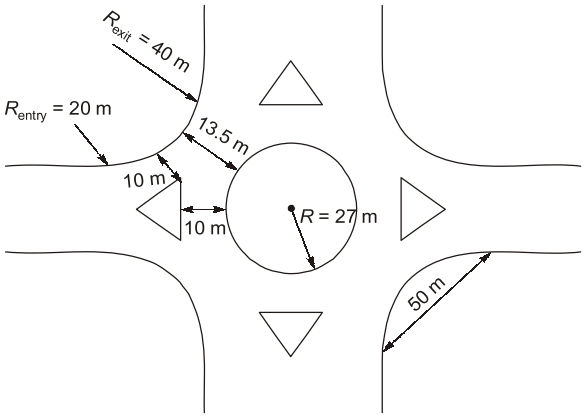
Solution : 2

Q_P = 3939 PCU/hour > 2875 PCUs/hour. Hence OK

Assuming R_{entry} = 20 m [15 m to 25 m – IRC]

$R_{central\ island} = 133 \times 20 = 26.6\ m = 27\ m$

$R_{exit} = 2 \times 20 = 40\ m$



Solution : 3

(i) 73.06 s, (ii) 26.18 s, 34.82 s

Solution : 4

33.47 kmph, 30.14 kmph

Solution : 5

$$v_{min} = \sqrt{\frac{2(M+m)gh}{M}}$$

Solution : 6

Available reserved capacity = 636.56 PCU/hr

Solution : 8

595.4 PCU_s/hr, 42 kmph, 46.15 kmph

Solution : 9

0.2 veh/s, $2e^{-2}$

Solution : 10

V_A = 22.31 kmph, V_B = 33.19 kmph

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3 Pavement Design

LEVEL 1 Objective Questions

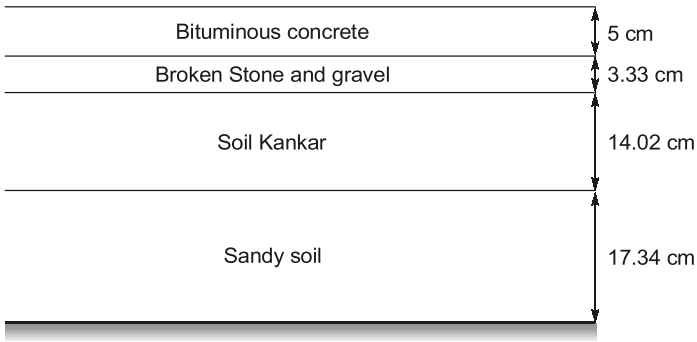
1. (d)
2. (b)
3. (d)
4. (b)
5. (c)
6. (b)
7. (b)
8. (a)
9. (c)

LEVEL 2 Objective Questions

10. (b)
11. (c)
12. (b)
13. (c)
14. (c)
15. (13.46)
16. (18.73)
17. (a)
18. (c)
19. (d)

LEVEL 3 Conventional Questions

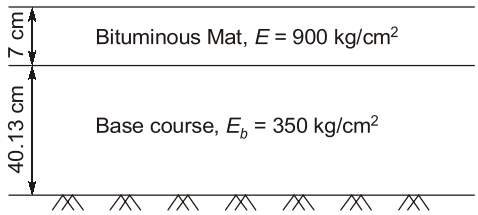
Solution : 1



(Pavement Section)

Solution : 2

Pavement section consist of 40.13 cm base course and 7 cm thick bituminous mat.



Solution : 4

Critical combination of stress in summer mid-night = load stress + warping stress – friction stress

$= 21.17 + 18 - 0.81 = 38.36 \text{ kg/cm}^2$

Critical combination of stress in summer midnight at corner = 17.91 + 4.67 = 22.58 kg/cm^2

Solution : 5

Provide spacing of expansion joints = 9 × 4.5 = 40.5 m

Solution : 6

Total length of tie bar = 42 cm

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4 Highway Materials

LEVEL 1 Objective Questions

1. (b)
2. (b)
3. (c)
4. (d)
5. (c)
6. (c)
7. (b)
8. (a)

LEVEL 2 Objective Questions

9. (b)
10. (c)
11. (c)
12. (21.72)
13. (d)
14. (2.30)
15. (d)
16. (a)

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