Q1. Which of the following is unmetalled road?
(a) Earthern road
(b) Cement concrete road
(c) Bituminous road
(d) WBM road

Q2. IRC recommendation for maximum width of a vehicle is
(a) 1.75 m
(b) 2.00 m
(c) 2.44 m
(d) 4.88 m

Q3. The target of achieving an overall density of road length in third twenty year road Development Plan (1981-2001) was
(a) 32 km /100km²
(b) 45.7 km /100km²
(c) 82 km /100km²
(d) 100 km /100km²

Q4. What is the IRC recommended width of a single lane carriageway?
(a) 3.50 m
(b) 3.75 m
(c) 2.5 m
(d) 3.00 m

Q5. Based on location and function, Nagpur Road Plan has classified the roads in india in
(a) 2 categories
(b) 4 categories
(c) 5 categories
(d) 6 categories

Q6. The width of carriageway for multi-lane pavements as recommended by the Indian Roads Congress is:
(a) 3.5 m per lane
(b) 3.75 m per lane
(c) 2.5 m per lane
(d) 3.65 m per lane

Q7. Which road pattern was assumed to prepare the formula of Nagpur Road Plan?
(a) Rectangular or block pattern
(b) Star and grid pattern
(c) Star and block pattern
(d) Star and circular pattern

Q8. Border Roads Organization for hilly regions, was formed in
(a) 1947
(b) 1954

(c) 1958
(d) 1960

Q9. What is the road within a city or town is called as?
(a) urban road
(b) town road
(c) country road
(d) rural road

Q10. The _____ boards was established in 1960.
(a) Border Road Development
(b) Central Road Development
(c) State Road Development
(d) Defence Road Development

Q11. Enoscope is used to determine
(a) spot speed
(b) average speed
(c) travel time
(d) none of these

Q12. Annual average daily traffic is obtained by determining average daily traffic volume recorded for
(a) 302 days
(b) 365 days
(c) 24 months
(d) 10 years

Q13. Webster's method is used for:
(a) Road marking
(b) Marking centerline of the road
(c) Determine design traffic volume
(d) Determine optimum signal cycle

Q14. If L is length of vehicles in meters, C is the clear distance between two consecutive vehicles (stopping sight distance), V is the speed of vehicles in km per hour, the maximum number N of vehicles/hours is ……
(a) $N = \frac{1000V}{L+C}$
(b) $N = \frac{L+C}{1000V}$
(c) $N = \frac{1000L}{C+V}$
(d) $N = \frac{1000C}{L+V}$

Q15. The travel time per unit length of road is _____ proportional to the speed.
(a) Cubically
(b) Directly

(c) Logarithmically
(d) Inversely

Q16. If the jam density on a road designed for a free mean speed is 75 km/h is 100 vehicles/km, then the capacity flow will be:
(a) 1500
(b) 1875
(c) 2250
(d) 2760

Q17. The distance travelled by a moving vehicle during perception and breaker action time is known as
(a) Sight distance
(b) Stopping distance
(c) Lag distance
(d) None of these

Q18. Expression for stopping distance (SD) for a vehicle is:
(a) $SD = vt + v^2/2gf$
(b) $SD = vt + v^2/4gf$
(c) $SD = vt + v^2/8gf$
(d) $SD = vt + v^2/16gf$
Where
V= speed of vehicle, t = reaction time of drive, f = design coefficient of friction

Q19. The most suitable traffic signal system for mixed traffic condition is
(a) simple progressive
(b) alternate
(c) simultaneous
(d) flexible progressive

Q20. In a parking area, the maximum number of vehicles can be parked with-
(a) parallel parking
(b) 30° angle parking
(c) 45° angle parking
(d) 65° angle parking

Q21. Charpy test is
(a) a bending test
(b) an impact test
(c) a fatigue test
(d) a hardness test

Q22. California bearing ratio (CBR)
(a) is a measure of soil strength
(b) is a procedure for designing flexible pavements
(c) is a method of soil identification

(d) is a measure to indicate the relative strength of paving materials

Q23. In a CBR test, if the CBR value at 5 mm is greater than that at 2.5 mm
(a) the higher value should be chosen
(b) the test should be repeated
(c) Average value of the two should be used
(d) none of these

Q24. The tie bars in a concrete pavement are provided in: -
(a) Contraction joints
(b) Expansion joints
(c) Longitudinal joints
(d) Construction joints

Q25. The height of the dowel above the road level should not be more than:
(a) 10 cm
(b) 20 cm
(c) 30 cm
(d) 40 cm

Q26. The pressure sustained per unit deformation of subgrade at specified deformation level using specified plate size is termed as
(a) CBR
(b) Safe bearing capacity
(c) Tangent modulus
(d) Modulus of subgrade reaction

Q27. The method of design of flexible pavement as recommended by IRC is:
(a) Group index method
(b) Westergaard method
(c) CBR method
(d) Benkelman beam method

Q28. The following test are conducted on the coarse aggregates for Road construction:
(a) Impact test, shape test and penetration test
(b) CBR value, Ductility test, Crushing test
(c) Bitumen Adhesion test, abrasion test
(d) Permeability test, crushing test, Viscosity test

Q29. Bottom most layer of pavement is known as-
(a) Wearing course
(b) Base course
(c) Sub-base course
(d) Sub grade

Q30. The magnitude of tyre pressure controls the following:
(a) Total thickness of pavement

(b) Number of layers to be provided in pavement
(c) type of sub-base and base course
(d) Quality of material to be used in the upper layers of pavement

Q31. Whose theory is primarily applied for designing rigid pavements?
(a) Bossinessq
(b) Westergaard
(c) Skempton
(d) Mc Cormec

Q32. In rigid pavements, the contraction joints spacing is normally provided as-
(a) 2.5 m
(b) 3.5 m
(c) 4.5 m
(d) 5.5 m

Q33. The top of the ground on which the foundation of the road rests is called as
(a) soil-sub grade
(b) sub-base course
(c) wearing course
(d) Base course

Q34. Water bound macadam roads are constructed with the following type of materials:
(a) Crushed stone aggregates
(b) Soil and Gravel mixture
(c) Disintegrated Rocks
(d) Moorum

Q35. Westergaard's method is used for the design of: -
(a) Flexible pavements
(b) Rigid pavements
(c) Both (a) and (b) above
(d) None of the above

Q36. The table below shows marshal mix design criteria for bituminous concrete. Identify the correct specified value for the test property.

Test property	Specified value
P) Marshall stability,	1) 75 to 85
Q) Flow value, 0.25 mm units	2) 340 (minimum)
R) Air voids in total mix V_V%	3) 3 to 5/3
S) Void filled with bitumen, VFB%	4) 8 to 16/8

(a) P-1, Q-2, R-3, S-4
(b) P-2, Q-4, R-3, S-1
(c) P-4, Q-2, R-1, S-3
(d) P-3, Q-1, c-R, S-2

Q37. The penetration test on bitumen is used for determining its
(a) Grade
(b) Ductility
(c) Viscosity
(d) None of these

Q38. The ductility value of bitumen is …….
(a) Equal to that of tar
(b) More than that of tar
(c) Less than that of tar
(d) None of these

Q39. As per I.R.C. for bitumen bound macadam maximum aggregate impact value in % will be:
(a) 35
(b) 20
(c) 30
(d) 25

Q40. As per BIS bitumen grade 85/40, 65/25 etc. the first and second number represents:
(a) softening and penetration point
(b) Flash point and softening point
(c) Penetration and softening point
(d) Flash and penetration point

Q41. The Los angels abrasion value (%) of aggregates to be used for the final layer of bituminous concrete is limited to:
(a) 25
(b) 30
(c) 40
(d) 50

Q42. The ductility of bitumen is expressed as
(a) time
(b) Distance
(c) Speed
(d) None

Q43. Resistance of the action of moving load (rubbing) is known as ……
(a) abrasion
(b) toughness
(c) ductility
(d) brittleness

Q44. The specific gravity of bitumen
(a) 0.8
(b) 0.9
(c) 2.02
(d) 1.02

Q45. Recommended grade of tar for grouting purpose is
(a) RT – 1
(b) RT - 2
(c) RT – 3
(d) RT – 5

Q46. The bitumen grade 80/100 indicates
(a) penetration value
(b) kinematic viscosity
(c) API gravity
(d) dynamic viscosity

Q47. Bitumen emulsion is:
(a) Liquid containing bitumen in suspension.
(b) Paint
(c) Used as anti-corrosive paint.
(d) All the above.

Q48. Which of the following grades of bitumen is the most suitable for a 7-day maximum average air temperature of 15°C?
(a) VG10
(b) VG20
(c) VG30
(d) VG40

Q49. Bitumen in
(a) Solid state is called asphalt
(b) Semifluid state is called mineral tar
(c) Fluid state is called petroleum
(d) All of the above

Q50. Los Angeles machine is used to test Aggregate_____
(a) Crushing strength
(b) Impact Value
(c) Abrasion resistance
(d) Water absorption

S1. Ans.(a)

Sol. Earthen roads is unmetalled road. This road is also known as fair weather roads.

S2. Ans.(c)

Sol. As per IRC

(a) Maximum width of vehicle = 2.44 m.

(b) Maximum height of vehicle = 4.75 m.

(c) Maximum length of vehicle = 18 m.

(d) Maximum length of vehicle = 52.2 Tonn.

S3. Ans.(c)

Sol. (a) In first 20-year road plan (1943-1963), road density is 16 km/100 km²

(b) In second 20-year road plan (1961-1981), road density is 32 km/100 km²

(c) In third 20-year road plan (1981-2001), road density is 82 km/100 km²

S4. Ans.(b)

Sol. Width of pavement-

Number of lane	Width of pavement
Single lane	3.75 m.
Two lane without kerb	7.0 m
Two lane with kerb	7.5 m
Intermediate lane	5.5 m
Multiple lane	3.5 m/lane

S5. Ans.(c)

Sol. According to Nagpur road plan, the roads has classified into 5 categories.

(i) National highway

(ii) Sate highway

(iii) Major district roads

(iv) Other district roads

(v) Village roads

S6. Ans.(a)

Sol. The width of carriage way for multi-lane pavements as per Indian road congress is 3.5/lane.

S7. Ans.(b)

Sol. Star and grid pattern assumed to prepare the formula of Nagpur road plan.

S8. Ans.(d)

Sol. Border road organization was formed in 7 may 1960.

S9. Ans.(a)

Sol. The road within a city or town is called urban roads.

S10. Ans.(a)

Sol. Border road development board was established in 1960.

S11. Ans.(a)

Sol. Enoscope or mirror box method is used to determine spot speed.

S12. Ans.(b)

Sol. Annual average daily traffic is obtained by determining average daily traffic volume recorded for 365 days.

Annual Average daily traffic (AADT) is given by –

$$\boxed{AADT = \frac{Total\ number\ of\ vehicle\ passing\ accross\ a\ section\ in\ a\ year}{365}}$$

S13. Ans.(d)

Sol. Webster's method is used for determining optimum signal cycle length (C_o) and it is given by according to webster's method–

$$\boxed{C_o = \frac{1.5L + 5}{1 - Y}}$$

L = Total lost time in a cycle length

Y = sum of critical flow rate for all phasess

S14. Ans.(a)

Sol. If L is the length of vehicles in m. C is the clear distance between two consecutive vehicles (SSD), V is the speed of vehicles in km/hour, Then maximum number of vehicle (N) is given by-

$\boxed{N = \frac{1000\,V}{L+C}}$ (Vehicles/hour)

S15. Ans.(d)

Sol. The travel time per unit length of road is inversely proportional to the speed.

$$\boxed{dt\ \alpha \frac{1}{V}}$$

S16. Ans.(b)

Sol. Give, jam density (kj) = 75 km/h.

free mean speed (V_{SF}) = 100 vehicles/km.

Maximum capacity flow (q_{max}) = ?

$q_{max} = \frac{V_{sf} \times kj}{4}$

$= \frac{75 \times 100}{4}$

= 1875 veh/hr.

S17. Ans.(c)

Sol. Lag distance is the distance travelled by a moving vehicle during perception and breaker action time.

S18. Ans.(c)

Sol. Stopping sight distance for a vehicle is given by-

$SSD = v.t + \frac{v^2}{2gf}$

v = velocity (m/sec)

f = longitudinal friction

t = perception reaction time

S19. Ans.(d)

Sol. The most suitable traffic signal system for mixed traffic condition is flexible progressive.

S20. Ans.(c)

Sol. In parking area, the maximum number of vehicles can be parked with 45° angle parking.

S21. Ans.(b)

Sol. Charpy test is an impact test. It is used to evaluate the relative toughness or impact toughness of materials.

S22. Ans.(a)

Sol. California Bearing ratio (CBR) is a measure of arbitrary soil strength. IRC consider CBR method for designing of flexible pavement.

S23. Ans.(b)

Sol. In a CBR test, If the CBR value at 5mm is greater than at 2.5mm then test should be repeated.

S24. Ans.(c)
Sol. The Tie bars in a concrete pavement are provided in Longitudinal joints. Tie bars are about 12.5mm in diameter and between 0.6 to 1.0 m long.

S25. Ans.(c)
Sol. Dowel bare are used in expansion joints. The height of the dowel above the road level should not be more than 30cm.

S26. Ans.(d)
Sol. The pressure sustained per unit deformation of subgrade at specified deformation level using specified plate size is termed as modulus of subgrade reaction.

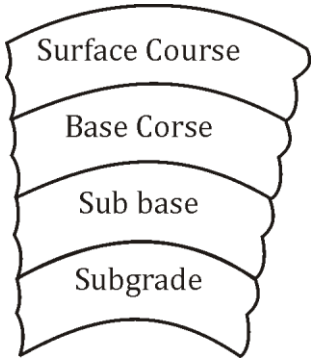
$$\boxed{Moduius\ of\ subgrade\ reaction\ (K) = \frac{pressure\ (P)}{Deflection\ (D)}}$$

(unit = kg/m³)
It is generally calculated at 0.125 cm or 1.25 mm.

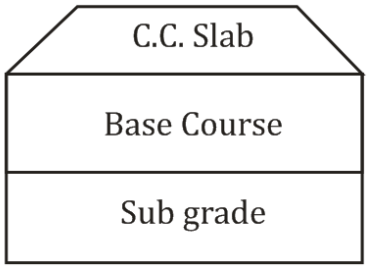
S27. Ans.(c)
Sol. IRC recommended CBR method of design of flexible pavement.

S28. Ans.(c)
Sol. There are some following tests are conducted on the coarse aggregates–
(i) Bitumen Adhesion test
(ii) Abrasion test
(iii) Crushing test
(iv) Impact test

S29. Ans.(d)
Sol. for flexible pavement →



for Rigid pavement →



S30. Ans.(a)
Sol. The magnitude of tyre pressure controls the quality of material to be used in the upper layers of pavement.

S31. Ans.(b)
Sol. Westergaard theory is primarily applied for designing rigid pavements.

S32. Ans.(c)
Sol. Contraction joints are used to prevent the contraction in rigid pavements. The contraction joints spacing is normally provided as 4.5. m.

S33. Ans.(a)
Sol. The top of the ground on which the foundation of the road rests is called as soil-sub grade.

S34. Ans.(a)
Sol. water bound Macadam roads are constructed with crushed stone aggregates or stone dust.

S35. Ans.(b)
Sol. Westergaard's method is used for the design of rigid pavement.

S36. Ans.(b)
Sol.

S37. Ans.(a)
Sol. The penetration test on bitumen is used for determining the Grade of bitumen.

S38. Ans.(c)
Sol. The ductility value of bitumen is less than that of tar.

S39. Ans.(c)
Sol. As per I.R.C for bitumen bound macadam maximum aggregate impact value will be 30%.

S40. Ans.(a)
Sol. As per BIS bitumen grade 85/40, 65/25 etc. the first and second number represents softening point and penetration or consistency point.

S41. Ans.(b)
Sol. The los angle abrasion value (%) of aggregate to be used for the final layer of bituminous concrete is limited to 30%.

S42 Ans.(b)
Sol. The ductility of bitumen is expressed as distance. The minimum ductility value of bitumen according to IRC is 75 cm.

S43. Ans.(a)
Sol. Resistance of action of moving load (rubbing) is known as abrasion.

S44. Ans.(d)
Sol. The specific gravity of bitumen is 0.97– 1.02.

S45. Ans.(d)
Sol. RT-1 ⇒ used for surface painting under cold weather.
RT-2 ⇒ Used for surface painting under normal India climate conditions.
RT-3 ⇒ Used for surface painting.
RT-4 ⇒ Used for premixing tar macadam.
RT-5 ⇒ Used for grouting purpose.

S46. Ans.(a)
Sol. The Bitumen grade 80/100 indicates penetration value.

S47. Ans.(a)

Sol. Bitumen emulsion a liquid containing bitumen in suspension. It is used for surface dressing, patch repair works and maintenance in rainy season.

S48. Ans.(a)
Sol. VG 10 ⇒ Most suitable for a 7-day maximum average air temperature of 15°C and also used in spraying application such as surface dressing and paving.
VG–20 ⇒ Used for paving in cold climate.
V-30 ⇒ Used construct extra heavy duty bitumen pavements.
VG-40 ⇒ Used in highly stressed area.

S49. Ans.(d)
Sol. Bitumen in
(a) Solid state is called asphalt
(b) Semifluid sate is called mineral tar
(c) fluid state is called petroleum.

S50. Ans.(c)
Sol. Crushing Test ⟶ Gives crushing strength
Impact Test ⟶ Gives Toughness
Los Angeles Test ⟶ Gives Abrasion resistance or hardness