TRANSPORTATION ENGINEERING AND PLANNING

Diploma Semester – 5

020030507

UNIT : 2 TRAFFIC ENGINEERING

1. The branch of engineering that deals with improvement of traffic performance, traffic studies and traffic network is called _____ a) Highway engineering
b) Railway engineering
c) Traffic engineering
d) Traffic management

2. The basic objective of traffic engineering is to achieve _____
a) Efficient, free and rapid flow of traffic with least priority given to accidents
b) Efficient, free and rapid flow of traffic with fewer accidents
c) Efficient and rapid flow of traffic
d) Rapid flow of traffic

3. The traffic is prepared based on an average 24-hour traffic volume at a given location for some period of time less than a year _____

a) Yearly traffic
b) Annual average daily traffic
c) Average daily traffic
d) Average yearly traffic

4. The hearing, visibility and reaction time are covered in which type of factors?
a) Physical
b) Mental
c) Psychological
d) Environmental

5. The width recommended by IRC for all type of vehicles is _____ a)
1.5m
b) 2.0m
c) 2.5m
d) 3.0m

6. The height of the vehicle mainly influences?
a) Width of pavement
b) Length of curve
c) Clearance under structures
d) Design velocity

7. The minimum number of parameters needed to measure brake efficiency is? a) One
b) Two
c) Three
d) Four

8. What is the first stage in traffic engineering studies?
a) Traffic volume studies
b) Spot speed studies
c) Speed and delay studies
d) Origin and destination studies

9. The traffic volume is usually expressed in _____
a) LMV
b) PCU
c) LCV
d) HCV

10. The number of vehicles that pass through a transverse line of road at a given time in a specified direction is called _____ a) Traffic studies
b) Traffic flow
c) Traffic origin
d) Traffic destination

11. HCV stands for _____
a) Heavy commercial vehicle
b) Heavy cash vehicle
c) Heavy consolidated vehicle
d) Hard commercial vehicle

12. The traffic flow is _____

a) Static
b) Dynamic
c) Static and dynamic
d) May be static or dynamic

13. What is the first objective of traffic volume studies?
a) To decide priority for improvement of roads
b) For geometric design
c) For computing roadway capacity
d) To plan traffic operation

14. Pedestrian data is used for planning _____
a) Highway
b) Sidewalks and cross-walks
c) Kerb
d) Camber

15. Which of the following method is more accurate for traffic analysis?
a) Manual count
b) Automatic count
c) Average of manual and automatic
d) Past records

16. The outgoing and incoming traffic are counted at _____
a) Traffic intersections
b) Highway
c) Urban roads
d) Traffic symbols

17. The traffic that is prepared based on 365 days of the year is called?
a) Yearly traffic
b) Annual average daily traffic
c) Average daily traffic
d) Average yearly traffic

18. The traffic design in India is based on _____
a) 10th hourly volume

b) 20th hourly volume
c) 30th hourly volume
d) 45th hourly volume

19. The geometric design in India are designed for _____
a) 85th percentile speed
b) 15th percentile speed
c) 98th percentile speed
d) 100 percentile speed

20. If the instantaneous speed of 4 vehicles are 35, 40, 45 and 50 then the time mean speed will be _____ a) 40kmph
b) 41kmph
c) 41.5kmph
d) 42.5kmph

21. Peak hour factor is expressed in percentage of _____
a) ADT
b) AADT
c) PCU
d) DF

22. The speed at any instant of time is called _____
a) Running speed
b) Travel speed
c) Spot speed
d) Space speed

23. The weaving maneuvers is a type of _____
a) Merging
b) Diverging
c) Intersection
d) Crossing

24. Which of the following does not affect traffic flow?
a) Vehicles travelling at speed
b) Length of the vehicle

c) Weather conditions
d) Geometric design

25. The maximum number of conflict points is formed in _____
a) One way regulation on one road
b) One way regulation on two roads
c) Two way regulation on one road
d) Two way regulation on both roads

26. What is the main cause of accidents in urban areas?
a) Improper planning
b) Extra wide roads
c) Additional thickness of the pavement
d) Traffic congestion

27. Traffic forecast is not influenced by _____
a) GDP
b) Industrial output
c) Population
d) Weather

28. PCU equivalent for car is

a) 0.5
b) 1.00
c) 2.25
d) 6.00

29. PCU equivalent for a hand cart is

a) 0.5
b) 1.00
c) 2.25
d) 6.00

30. The road geometrics in India are designed for the

a) 98^{th} highest hourly traffic volume

b) 85th highest hourly traffic volume
c) 50th highest hourly traffic volume
d) 30th highest hourly traffic volume

31. PCU equivalent for a cycle is

a) 0.5
b) 1.00
c) 2.25
d) 6.00

32. The safe speed on a highway is

a) 50th percentile speed
b) 75th percentile speed
c) 85th percentile speed
d) 98th percentile speed

33. 'weaving' is

a) merging
b) diverging
c) crossing
d) merging, travelling, diverging

34. The maximum number of points of conflicts in two way two lane roads meeting at right angles is

a) 12
b) 32
c) 4
d) 24

35. Traffic density is

a) no. of vehicles moving in a specific direction per lane per day
b) no. of vehicles moving in a specific direction per hour
c) no. of vehicles per unit length
d) max. no. of vehicles passing a given point in one hour

36. An advantage of manual counting of traffic is

a) permits traffic classification by the type of vehicle
b) suited in any climate
c) highly accurate
d) it can be carried out for any length of time

37. An instrument used to study ‘spot speeds’ in traffic engineering is

a) speedometer
b) enoscope
c) speed recorder
d) enometer

38. ‘Fixed delay’ in a highway is due to

a) pedestrians crossing the rod
b) parked vehicles
c) traffic signals
d) road repairs

39. The minimum radius for intersection curve when the speed is 35 kmph is

a) 15m
b) 25m
c) 35m
d) 50m

40. Name the traffic survey data which is plotted by means of ‘desire lines’

a) accident
b) classified volume
c) origin and destination
d) speed and delay

41. The 30^{th} highest hour volume is
a) The average of the 30 peak hour volumes in a month
b) The hourly volume which is exceeded by only 30 hours in a year
c) The hourly volume which is exceeded by only 29 hours in a year
d) The average of the 30 highest hourly volumes in a year

42. If a two-lane national highway and a two-lane state highway intersect at right angles, the number of potential conflict points at the intersection, assuming that both the roads are a) 11
b) 17
c) 24
d) 32

43. Moving car observer method is a procedure

a) to find the traffic flow of a traffic stream
b) to estimate the traffic capacity of road section
c) to carry out origin destination studies
d) to identify accident locations on highways

44. In desire-line diagram

a) width of desire line is proportional to the number of trips in one direction
b) length of desire line is proportional to the number of trips in one direction
c) width of desire line is proportional to the number of trips in both directions
d) both width and length of desire line is proportional to the number of trips in both directions

45. What is the maximum number of passenger cars that can pass a given point on a lane or roadway during ideal roadway and traffic conditions known as?

a) practical capacity
b) possible capacity
c) basic capacity
d) road capacity

46. In highway geometric design once the cumulative speed distribution is drawn, the design adequacy is checked at which percentage?

a) 89^{th} percentile
b) 85^{th} percentile
c) 98^{th} percentile
d) 99^{th} percentile

47. Space mean speed is

a) the harmonic mean of spot speeds

b) the sum of spot speeds
c) the arithmetic mean of spot speeds
d) the sum of journey speeds

48. The instantaneous speed of a vehicle at a specified location is called

a) Spot speed
b) Journey speed
c) Running speed
d) Time mean speed

48. Which of the following is not a derived characteristic?

a) Time headway
b) Distance headway
c) Travel time
d) Density

49. Which among the following is the fundamental equation of traffic flow? a)

$q = k/v$

b) $q = kv$
c) $v = qk$
d) $q = k^2v$

50. When speed of the traffic flow becomes zero, when

a) traffic density attains its maximum value whereas traffic volume becomes zero
b) traffic density and traffic volume both attains respective maximum values
c) traffic density and traffic volume both becomes zero
d) traffic density becomes zero and traffic volume attains its maximum value

UNIT 3 : ROAD MATERIALS AND ITS CONSTRUCTION ASPECTS

1. The materials not included in highway construction are _____ a) Stone
b) Dust
c) Soil

d) Petrol

2. For places where there is a passage of flood water then the highway has to be built on _____

a) Embankment
b) Subway
c) Overpass
d) Underpass

3. The layer which is constructed above embankment is called _____ a) Sub grade
b) Fill
c) Base
d) Sub base

4. The highest CBR number is required for _____
a) Pavement
b) Sub grade
c) Sub base
d) Base

5. What is the most common waste material used in construction?
a) Fly ash
b) Slag
c) Pozzolona
d) Rice husk

6. Bitumen is a by-product of _____
a) Wood
b) Petroleum
c) Kerosene
d) Coal

7. Tar is a by-product of _____
a) Wood
b) Petroleum
c) Kerosene

d) Coal

8. In the initial stage of construction which type of pavement is cheap? a) Flexible
b) Rigid
c) Composite
d) WBM

9. The stabilization of roads is not done in _____
a) Sub grade
b) Base
c) Sub base
d) Surface Layer

10. The subgrade thickness is compacted to _____
a) 200 mm
b) 300 mm
c) 400 mm
d) 500 mm

11. In crushing test, dry aggregates passing through _____ mm sieve and retained _____ mm in a cylinder. a) 12.5, 10
b) 11.5, 10
c) 12.5, 11.5
d) 10, 2.36

12. According to IS: 2386 part-IV, each layer is tamped _____ times in crushing test. a) 20
b) 25
c) 30
d) 10

13. A value less than 10 signifies an exceptionally _____ while above 35 would normally be regarded as _____
a) Strong aggregates, weak aggregates
b) Weak aggregates, strong aggregates
c) Strong aggregates, strong aggregates
d) Weak aggregates, weak aggregates

14. Los Angeles machine consists of circular drum of internal diameter _____ mm and length _____ mm. a) 700, 700
b) 520, 520
c) 520, 700
d) 700, 520

15. Which machine is preferred for abrasion test?
a) Vicat's mould
b) Los Angeles
c) Flakiness Gauge
d) Elongation Gauge

16. A maximum value of _____ percent is allowed for WBM base course in Indian conditions. a) 25
b) 35
c) 40
d) 50

17. Aggregates to be used for wearing course, the impact value shouldn't exceed _____ percent. a) 30
b) 35
c) 40
d) 25

18. What is the range of water absorption of aggregates used in road? a) 2.5-2.9
b) .1-2
c) .1-2.5
d) 2-2.9

19. If 60% aggregates doesn't pass through the 2.36mm sieve, then what would be the value of Aggregate impact value? a) 60%
b) 40%
c) 25%
d) 100%

Explanation: Aggregate impact value = (W1/W2)*100
= {(100-60)/100} * 100 = 40%.

20. Bitumen is _____
a) Pyrogenous
b) Natural
c) Either natural or pyrogenous
d) Artificial

21. The bitumen is completely soluble in _____
a) Carbon monoxide
b) Carbon dioxide
c) Carbon sulfide
d) Carbon disulfide

22. The resistance to flow is measured by _____
a) Flash and fire
b) Viscosity
c) Penetration test
d) Ductility test

23. The temperature used in highway pavement in degrees centigrade is _____ a) 130
b) 120
c) 115
d) 175

24. The solvent used in cut back bitumen is _____
a) Kerosene
b) Oil
c) Petrol
d) Diesel

25. The bitumen surface becomes stiff in _____
a) Summer
b) Winter
c) Rainy
d) Spring

26. The distance between two samples in penetration test should be _____ a) 10mm
b) 15mm
c) 20mm
d) 25mm

27. Which layer of pavement should withstand stress?
a) Surface
b) Sub grade
c) Sub base
d) Base

28. The modulus of sub grade reaction on is the pressure corresponding to a plate statement of a)

0.125 cm

b) 0.25 cm
c) 0.375 cm
d) 0.50 cm

29. As per revised method, the modulus od subgrade reaction corresponds to a pressure of a)

0.125 kg/cm^2

b) 0.25 kg/cm^2
c) 0.7 kg/cm^2
d) 0.70 kg/cm^2

30. In CBR test the value of CBR is calculated for penetration of

a) 0.125 mm
b) 2.5 mm only
c) 5 mm only
d) 5 mm also

31. CBR test is a/an

a) rationalistic strength test
b) arbitrary strength test
c) shear resistance test

d) impact test

32. The desirable aggregate crushing value for a surface course is

a) 30 %
b) 40 %
c) 45 %
d) 50 %

33. Los Angles Abrasion test is actually

a) abrasion test only
b) abrasion cum impact test
c) strength test also
d) none

34. The maximum permissible aggregate impact value to be used in base course is a)

10 %

b) 20 %

c) 30 %

d) 45 %

35. The general range of angularity number for aggregates used in constructions is a)

0 to 11

b) 11 to 20
c) 20 to 30
d) 30 to 45

36. For standard 2.5 mm penetration, the standard load in CBR test is a)

1000 kg

b) 1370 kg
c) 2055 kg
d) 70 kg

37. The grade of bitumen generally preferred in hot climates is a)

30/40

b) 80/100
c) 100/40
d) 100/20

38. Pick up the incorrect pair:

a) Ductility test : Adhesiveness and elasticity
b) Spot test : Detecting cracked bitumen
c) Float test : Stiffness or consistency
d) Viscosity : Softening point

39. Flash and fire point test is conducted using

a) ring and bell
b) Benkelman test
c) Pensky martens closed cup
d) None

40. Pick up the correct statements:

a) The ductility value if Bitumen for suitability in road construction should not be less than 50cm
b) specific gravity of pure bitumen is in the range of 1.10 to 1.25
c) minimum specified flash point of bitumen used is road construction is 175^0 C d) All the above

41. Read the following statements about Cut back

1. It is a bitumen, the viscosity of which has been reduced by a volatile dilutent.

2. Used for surface dressing.

3. Useful for patch repairs of these, the correct statements are

a) 1 only
b) 1 and 2 only
c) 1 and 3 only
d) All

42. RC-O, MC-O and SC-O correspond to cutbacks of

a) Viscosity of ascending order
b) Viscosity of descending order
c) Same velocity
d) None of the above

43. Pick up the correct pair:

a) Rapid curing : Naphtha
b) Medium curing : Kerosene
c) Slow curing : High boiling point
d) All are correct

44. Bitumen stabilization of sandy soils can be done using _____ cut back.

a) Rapid curing
b) Medium curing
c) Slow curing
d) None

45. The mast fluid cut back is

a) RC-0
b) RC-1
c) MC-2
d) SC-3

46. Bitumen emulsion consists of

a) Bitumen, water, emulsifying agent
b) Bitumen, oil, cutback
c) Bitumen, water only
d) Bitumen, water, tar

47. Bitumen emulsions are used for

a) Bituminous macadam
b) Bituminous concrete
c) Bituminous carpets

d) Patch repair works

48. Bitumen of grade 30/40 means its penetration value is

a) 30 to 40 mm
b) 3 mm
c) 3 to 4 mm
d) 4 mm

49. Pick up the incorrect pair:

a) RT – 1 : In exceptionally how weather
b) RT – 2 : Surface painting under normal
c) RT – 3 : Base course
d) RT – 4 : Grouting purpose

50. Pick up the incorrect pair

a) Tar is obtained from destructive distillation of wood or char cool whereas bitumen is obtained from fractional distillation of petroleum
b) Percentage of free carbon in bitumen is less than bitumen
c) In presence of water tar coats aggregates better than bitumen
d) Bitumen is more temperature susceptible

UNIT 4 : DESIGN OF HIGHWAY PAVEMENT

1. The surface of the highway pavement should be designed to allow _____
a) High rolling resistance
b) Low rolling resistance
c) No rolling resistance
d) Very high rolling resistance

2. The most superior material is used in _____
a) base
b) sub base
c) surface
d) soil

3. The soil sub grade suitable for pavement is _____
a) Gravel
b) Sand
c) Black cotton soil
d) Red soil

4. The drainage layer is _____
a) Sub grade
b) Sub base
c) Base
d) Surface

5. What is the minimum thickness of compacted sub grade?
a) 300 mm
b) 500 mm
c) 700 mm
d) 900 mm

6. What is the most common test used in evaluating soil strength?
a) CBR
b) DCP
c) Triaxial
d) Plate bearing test

7. The CBR standard penetration is _____
a) 2.5 mm
b) 5.0 mm
c) 7.5 mm
d) 25 mm

8. What is the minimum thickness of seal coat?
a) 20mm
b) 25mm
c) 30.m
d) 35mm

9. The impact value of aggregate used in the pavement is _____ a)
30
b) 40
c) 50
d) 60

10. The abrasion value of the aggregate in pavement should be less than _____ a)
30
b) 40
c) 50
d) 60

11. The number of factors considered for flexible pavement is _____ a)
One
b) Two
c) Three
d) Five

12. The contact pressure is given by _____
a) Pa
b) a/P
c) P/A
d) PA

13. The distribution of circular load was obtained by _____
a) Wester guard
b) Boussinesq
c) McAdam
d) Taylor

14. What is the last step in the design of flexible pavement?
a) Design of sub grade
b) Design of base
c) Design of mix
d) Design of the pavement thickness

15. The pressure in pneumatic tyres should not exceed _____

a) 10Kg/cm^2
b) 9.5Kg/cm^2
c) 9Kg/cm^2
d) 8Kg/cm^2

16. The presence of moisture content causes _____
a) Swelling
b) Shrinkage
c) Alternate swelling and shrinkage
d) Frost

17. Which frost heave is dangerous?
a) Unlike frost heave
b) Like frost heave
c) Uneven frost heave
d) Even frost heave

18. Boussinesq assumed soil as _____
a) Homogeneous
b) Heterogeneous
c) Rigid
d) Flexible

19. Two elastic theory was developed by _____
a) Boussinesq
b) Westergard
c) Burmister
d) McAdam

20. Boussinesq assumed the load as a _____
a) Point load
b) UDL
c) UVL
d) Triangular load

21. The soil sub grade design is done by _____
a) Plate bearing test
b) CBR

c) Plate load test
d) Shear test

22. Failure in rigid pavement occurs due to _____
a) More compaction
b) Less compaction
c) More load
d) Less load

23. What is the size of particles preferred in GSB layer of pavement?
a) 0.075 mm
b) 0.150 mm
c) 0.300 mm
d) 0.600 mm

24. The drainage layer of pavement can _____
a) Increase the pavement life
b) Decrease the pavement life
c) Increase the pavement thickness
d) Decrease the pavement thickness

25. The base course uses _____
a) RCC
b) Wet lean concrete
c) Dry lean concrete
d) Heavy weight concrete

26. The spacing between construction joints in rigid pavement is?
a) 4.5 m
b) 5.0 m
c) 5.5 m
d) 6.0 m

27. Empirical method is dependent on the strength of _____
a) Soil
b) Sub base
c) Base

d) Surface

28. CBR is a _____
a) Measure of soil strength
b) Flexible pavement design method
c) Rigid pavement design method
d) Measure of soil characteristics

29. The design charts are prepared based on _____
a) Climate
b) Past experience
c) Location
d) Traffic

30. The CBR method was developed by _____
a) California division of highway
b) IRC
c) MORTH
d) NHAI

31. The soaking period in CBR sample is _____
a) 2 days
b) 3 days
c) 4 days
d) 5 days

32. What is the total thickness of the pavement?
a) Constant
b) Changes with sub grade
c) Changes with sub base
d) Changes with base

33. The top 500mm of soil sub grade should be compacted at _____
a) OMC
b) MDD
c) Dry density
d) Saturated density

34. What is the maximum aggregate size in CBR method?
a) 20 mm
b) 30 mm
c) 40 mm
d) 50 mm

35. The design factor not considered in CBR is _____
a) Weather
b) Traffic
c) VDF
d) Growth rate

36. The heavy commercial vehicles are considered if their weight exceeds _____ a) 3.0 t
b) 4.0 t
c) 5.0 t
d) 6.0 t

37. Based on topography and climate of the location which factor is estimated? a) Temperature
b) Pavement quality
c) Pavement thickness
d) Pavement design method

38. The warping stress is dependent on _____
a) Length of slab
b) length and width of slab
c) Thickness of slab
d) Water content in slab

39. The factor of safety is the stress caused at _____
a) Mid day
b) Summer
c) Winter
d) Rainy

40. The pavement thickness is usually assumed in rigid pavement as _____ a)
20 cm
b) 25 cm
c) 30 cm
d) 35 cm

41. What is the Equivalent single wheel load of dual wheel assembly carrying 20440 N each for pavement thickness of 20 cm? Center spacing of tyres is 27 cm and the distance between the walls of tyres is 11 cm

a) 27600 N
b) 32300 N
c) 40880 N
d) 30190 N

42. In CBR test the value of CBR is calculated for a penetration of
a) 0.125 mm
b) 2.5 mm only
c) 5 mm also
d) 7 mm

43. Flexible pavement distribute the wheel loads

a) through slab action
b) directly to subgrade
c) by grain to grain transfer through a set of layers to subgrade
d) None of the above

44. The present method of design of flexible pavement as per IRC is based on a)

CBR

b) Cumulative standard axles
c) Both A and B
d) None of the above

45. The number of load cycles to cause the failure of a pvament is proportional to (P is respective applied load)

a) p^4

b) p^{-4}

c) p^2

d) 1/p

46. In a dual wheel assembly if "p" is equal to each wheel load 's' is center spacing of dual wheels and 'd' is the clear distance between wheels, then the equivalent single wheel load for a depth between d/2 and 2s

a) P
b) 2P
c) between P and 2P
d) None

47. Variation of rigidity factor for a tyre pressure is as follows:

a) Equal to 1.0 for an average tyre pressure of 7 kg/cm^2
b) <1 for tyre pressure greater than 7 kg/cm^2
c) >1 for tyre pressure greater than 7 kg/cm^2
d) All the above are correct

48. Which of the following is a theoretical method of pavement design

a) CBR method
b) Triaxial test method
c) Mc – load method
d) Burimester method

49. Main drawback of 'CBR' method is that

a) gives total thickness which remains the same irrespective of the quality
b) does not consider the strength parameters of soil
c) it is a complex method
d) None of the above

50. The main cause of rattling below the flexible pavement is

a) vehicular traffic
b) absence of surface drainage
c) improper mix of pavement

d) consolidation of one or more layers of pavement