PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2021- 22 Examination

Semester: 8th   Date: 30/03/2022
Subject Code: 203104447   Time: 10:30 am to 01:00 pm
Subject Name: Geometric Design of Highways   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 **Objective Type Questions** - (Fill in the blanks, one word answer, MCQ-not more than Five in case **(15)**
of MCQ) (All are compulsory) (Each of one mark)

1. The most important factor that is required for road geometrics is _____
a) SSD   b) OSD
c) ISD   d) Speed of vehicle

2. A super-elevation e is provided on a circular horizontal curve such that a vehicle can be stopped on the curve without sliding. Assuming a design speed v and maximum coefficient of side friction fmax, which one of the following criteria should be satisfied?
a) e< f max   b) e>f max
c) no limit on e can be set   d) No of the above

3. On a single lane road with two way traffic , the minimum stopping sight distance is equal to
a) stopping distance   b) two time the stopping distance
c) half the stopping distance   d) three time the stopping distance

4. For highway geometric design purpose the speed is _____
a) 15th percentile   b) 50th percentile
c) 85th percentile   d) 98th percentile

5. In case of summit curve , the deviation angle will be maximum when
a) an ascending gradient meets with another ascending gradient
b) an ascending gradient meets with descending gradient
c) an descending gradient meets with another descending gradient
d) an ascending gradient meets with a level surface

6. A vehicle is moving on a highway at a speed of 80 kmph. If the coefficient of friction between the road surface and the tyres is 0.35 and the reaction time of the driver is   2.5 sec, then the lag distance is ……….

7. A horizontal curve of radius 250 m is to be provided on a state highway in plain Terrain with a super elevation of 0.07 and lateral coefficient of friction is 0.15. The ruling design speed for the curve is …………

8. The direct interchange ramps involve diverging to the right side and _____ from right

9. The value of camber recommended for CC roads in area of heavy rainfall is _____

10. The convexity provided to the carriage way between the crown and edge of pavement is known as_____

11. A major district road of WBM is to be constructed for a width of 3.8 m in a heavy rainfall region. The height of the crown with respect to the edges is …….., For WBM road, a camber of 1 in 33 is provided in the heavy rainfall region.

12. Wrie a formula to find overtaking site distance.

13. Define off-tracking

14. Define superelevation

15. Define ruling gradient

Q.2 Answer the following questions. (Attempt any three)   (15)
   A) Explain extra widening in detail.
   B) Explain objective for providing transition .
   C) Explain Set back distance on horizontal curve
   D) Enlist and explain cross sectional element of highway .

Q.3 A) The speed of overtaking and overtaken vehicles are 90 kmph and 60 kmph respectively   (07)
      on a two way traffic road. If the acceleration of the overtaking vehicle is 0.9 m/sec2, the
     safe overtaking sight distance is …….
   B) Explain Cloverleaf interchange with neat sketch.   (08)
                                        OR
      B) Explain Channelization.   (08)
Q.4 A) Explain Diamond interchange   (07)
                                        OR
   A) A vertical summit curve is formed at the intersection of two gradient,+3 and – 5 percent. Design   (07)
   the length of summit curve to provide a SSD for a design speed of 80 kmph .Assume other   data
    B) While aligning a highway in a plain terrain , the radius of horizontal curve is 325 m. Design the   (08)
    following geometric features
    1-Superelevation 2-Length of transition curve
    Data available are design speed = 60 kmph , l= 6m , pavement width including extra widening =
    11.05 m