

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**M.Tech. Winter 2019 - 20 Examination**

**Semester: 1****Subject Code: 203211130****Subject Name: Geometric Design of Highway****Date: 18/12/2019****Time: 10:30 am to 01:00 pm****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** A) Enlist the cross sectional elements of highway and describe any two in details. Draw the sketch of sectional view of highway. (05)

B) Explain the difference between rotary and roundabout with neat sketch. (05)

C) Explain the Extra widening of pavements in detail (05)

**Q.2** Answer the following questions. (Attempt any three) (Each five mark) (15)

A) Explain PIEV Theory.

B) Explain grade separated interchanges neat sketch

C) What are the types of road patterns? Explain with neat sketch.

D) Enlist various factors affecting the selection of an alignment.

**Q.3** A) Illustrate with a sketch angled on-street parking facility and derive the length required to park N number of vehicles with the help of neat diagrams. (07)

B) The width of approaches for a rotary intersection is 12 m. The entry and exit width at the rotary is 10 m. Table below gives the traffic from the four approaches, traversing the intersection. Find the capacity of the rotary.

Approach	Turning		
	LEFT	STRAIGHT	RIGHT
N	400	700	300
S	350	370	420
E	200	450	550
W	350	500	520

(08)**OR**

B) While designing a highway in built up area it was necessary to provide horizontal curve of radius 335 m. With Design Speed = 60 kmph, Length of wheel base = 6.1m, Pavement Width = 10.5 m Design the following geometric features: (08)

a) Super elevation b) Extra widening of pavement c) Length of transition curve..

**Q.4** A) Explain the following with IRC specification: (07)

i) Ruling gradient ii) Limiting gradient iii) Exceptional gradient iv) Minimum gradient.

**OR**

B) The speed of overtaking and overtaken vehicle are 60 kmph and 55 kmph respectively, on two way traffic road .If the acceleration of overtaking vehicle is  $0.99\text{m/sec}^2$ . (07)

I) Calculate the safe overtaking sight distance

II) Calculate minimum and desirable length of OSD

Draw the neat sketch of overtaking zone and show the position of the sign post.

B) Explain the following terms:

a. Clover leaf interchange

b. Channelized intersection

c. Extra widening of pavements

d. Width of the rotary (08)