Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Highway Engineering
Subject Code: 4TE04HYE1 **Branch: B.Tech (Civil)**
Semester: 4 **Date: 08/05/2018** **Time: 10:30 To 01:30** **Marks: 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions** **(14)**

a) NHAI stands for…….. (1)
b) What are the requirements of an ideal alignment of road? (1)
c) What do you understand by word Dead man or Muttam? (1)
d) Draw a sketch showing component parts of pavement structure. (1)
e) Enlist the methods which are commonly used for design of flexible pavement. (1)
f) What is mud pumping? (1)
g) Name the types of joint in cement concrete road. (1)
h) What is Joint filler and Joint sealer? (1)
i) Draw a neat sketch of simple circular curve. (1)
j) Define arboriculture. (1)
k) Enlist the basic test of aggregate. (1)
l) Define Widening of road on curves. (1)
m) What do you understand by degree of the curve? (1)
n) What are the methods of construction of cement concrete road? (1)

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

A) For locating a highway, explain the field surveys which are undertaken. **(7)**
B) Compare the Nagpur road plan and the second twenty year road plan; discuss the merit of each. **(7)**

Q-3 **Attempt all questions** **(14)**

A) Explain with sketches the various factors controlling the alignment of road. **(5)**
B) Explain PIEV theory. **(4)**
C) Calculate the stopping sight distance on a highway at a descending gradient of 2% for a design speed of 80 kmph. Assume other data as per recommendations. **(5)**

Q-4 **Attempt all questions** **(14)**

A) The speeds of overtaking and overtaken vehicles are 70 and 40 kmph, respectively on a two way traffic road. If the acceleration of overtaking vehicle is 0.99 m/sec^2. **(7)**

(a) Calculate safe overtaking sight distance.
(b) Mention the minimum length of overtaking zone and
(c) Draw a neat-sketch of the overtaking zone and show the position of sign posts.

B) A national highway passing through rolling terrain in heavy rainfall area has a horizontal curve of radius 500 m. Design the length of transition curve assuming suitable data. **(7)**

Q-5 **Attempt all questions** **(14)**

A) What are the objects and scope of traffic engineering? Explain briefly. **(7)**

B) Why is it important for highway engineer to study the behavior of soil? What are the desirable properties of sub grade soil? Enumerate the identification and classification tests of soils. **(7)**

Q-6 **Attempt all questions** **(14)**

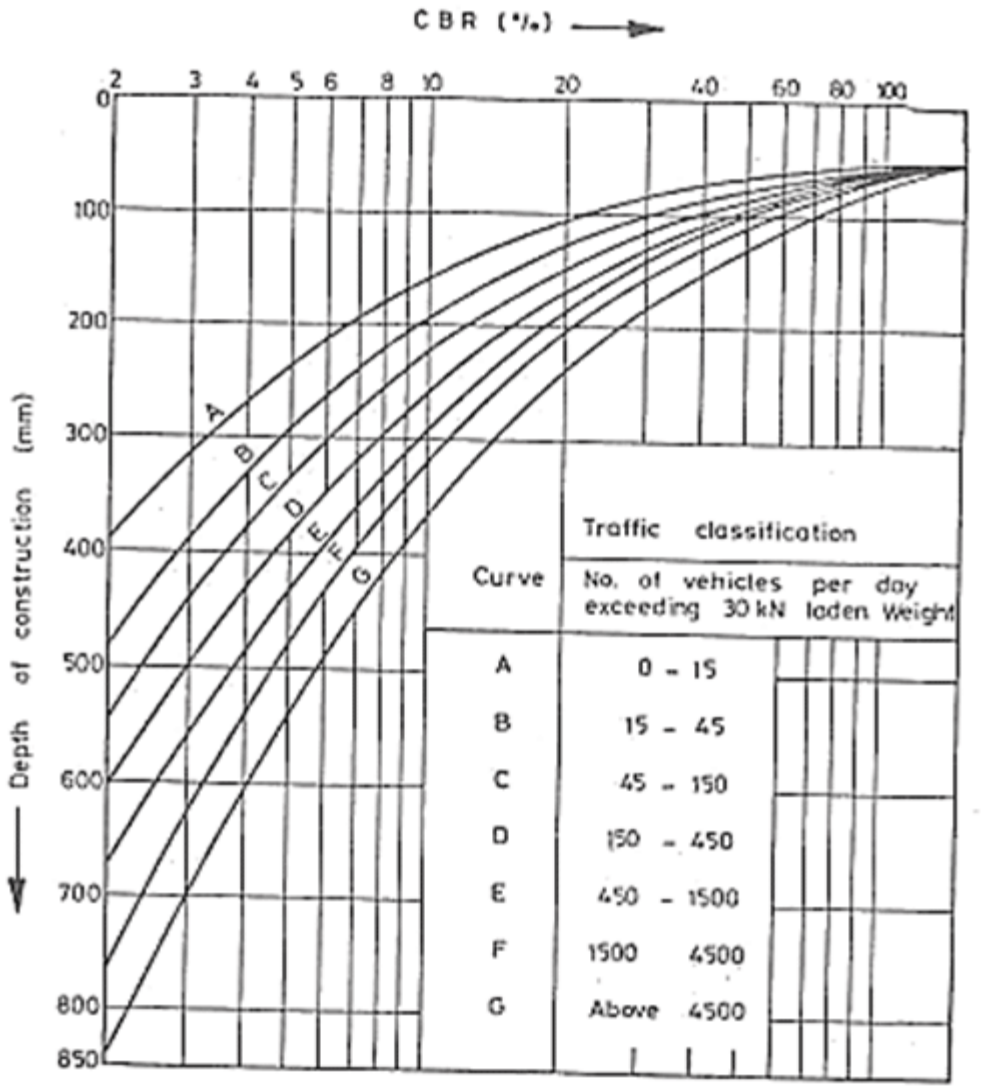
A) What are the different types of bituminous material used in road construction? Under what circumstances each of these materials is preferred? **(7)**

B) Discuss about maintenance of highway along with failure of flexible and rigid pavement. **(7)**

Q-7 **(14)**

Design a flexible pavement for a given data as:

(1) Expected traffic is 800 vehicles/day
(2) Area of plunger is 19.6 cm^2
(3) Load at penetration of 5 mm is 80 kg
(4) Load at penetration of 2.5 mm is 58 kg.
(5) W.B.M base C.B.R is 80%
(6) Moorum sub-base C.B.R is 30%



B) Explain the stepwise procedure in the design of rigid pavements. **(7)**

Q-8 **Attempt all questions** **(14)**

A) State and explain the requirements of a good road drainage system. **(4)**

B) What is W.B.M? Explain the construction method of W.B.M **(5)**

C) Discuss the desirable properties of bitumen. Explain the penetration test and its use. Also compare Tar and Bitumen. **(5)**