Government College of Engineering, Amravati
(An Autonomous Institute of Government of Maharashtra)

Fourth Semester B. Tech. (Civil Engineering)

Summer – 2016

Course Code: CEU402

Course Name: Transportation Engineering

Time: 2 hr. 30min.   Max. Marks: 60

Instructions to Candidate
1) All questions are compulsory.
2) Diagrams/sketches should be given wherever necessary.
3) Figures to the right indicate full marks.

1.   **Solve any _two_ of following**

   (a)   Briefly explain the engineering surveys needed   06
         for locating a new highway.

   (b)   What is meant by Gradient? State the objects   06
         of providing it. On what factors does it
         depend? State the values of gradient as per
         recommendations of I.R.C. for different
         classes of terrain.

   (c)   Explain briefly the different types of   06
         bituminous materials used in the construction
         of black top roads. Also state the grades of
         road Tar and the situations for which they are
         suited.

2.   (a)   Explain the component parts of the pavement   08
           structure of a road and their functions.

(b) List the different types of bituminous roads 04 and state the examples of each type.

3. (a) Explain briefly construction procedure of 06 premix carpet.

(b) Explain with the help of neat sketch the 06 transverse joints provided in concrete pavements.

4. (a) Describe the basic hydraulic and ground data 06 needed for the design of a bridge.

(b) Explain the following component parts of a 06 bridge with the help of neat sketches and state their suitability-
i) Trestle pier   ii) Abutment with return wing wall iii) Rocker bearing

5. **Solve any *two* of following**

(a) Explain with the help of neat sketches the 06 following types of bridges-
i) R.C.C. hollow girder bridge
ii) Steel truss bridge

(b) Explain the terms 'normal scour depth'. How 06 is it determined at the proposed bridge site?

(c) Explain with the help of neat sketches the drift 06 method of tunnel construction.

ndation- Open / Spread, Raft, Pile, Well Cofferdam
Box Caisson
- Solid, dumbellshape, Hammer head, trestle, frame, cylindrical
Hollow / Cellular
ments - Without - Buried, T, straight
With - straight, Return, spalyed

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1. (a) Describe the various stages in a new highway project.   03

    (b) State the various objectives of preliminary survey for highway alignment. Enumerate the details to be collected and the various steps involved in it.   03

    (c) Draw a neat sketch showing cross section of National highway in cutting showing all important dimensions.   03

    (d) Define Camber. State its necessity. State the values of camber for different regions recommended by IRC.   03

    OR

    Explain ruling, minimum and exceptional gradients. Specify the values recommended by IRC for plains and hills.

2. (a) A national highway passing through a flat terrain 06 has a horizontal curve of radius equal to the ruling minimum radius. If the design speed is 100 kmph, calculate the absolute minimum sight distance, super elevation and extra widening required. Assume necessary data suitably.

(b) List the various tests required to be conducted on 06 bitumen and state the purpose of each. Also state the minimum values of these properties normally required.

3 (a) Explain with a neat sketch the design of flexible 06 pavements by CBR method. Also state the advantages and limitations of the method.

(b) Explain in detail the Marshall method of 06 bituminous mix design of materials.
OR
What are the different types of bituminous constructions usually adopted? Explain in detail the construction procedure for penetration macadam.

4 (a) Explain in brief the typical flexible pavement 06 layers failures. Explain the necessity of design approach and method of strengthening of existing pavements for the case flexible overlay over flexible pavement.
OR
State the purpose of providing joints in rigid pavements. Explain with the help neat sketch the construction of contraction and longitudinal joints.

(b) Explain in brief the classification of bridges based 04 on various criteria. Also state the suitability of

each one of them.

(c) Define following terms: 02
   i)   Liner waterway
   ii)   Scour depth
   iii) Afflux
   iv)   Economic span of bridge

5 (a) Draw a neat sketch of a typical bridge showing   06
        the various bridge components. Explain the
        functions of the various bridge components.

   (b) Draw neat sketch of a typical tunnel cross section   03
        suitable for a two-lane highway tunnel showing
        important dimensions.
        OR
        Explain the necessity of the following in case of a
        tunnel.
        i)   Lining of tunnels
        ii)   Drainage
        iii) Ventilation

   (c) List the various methods of tunneling in hard   03
        rock. Explain briefly any one of them.