

KATHMANDU UNIVERSITY  
End Semester Examination  
March/April 2017

Marks Scored:

Level : B.E.

Year : IV

Course : CIEG 401

Semester: I

Exam. Roll No.:

Time : 30 mins.

F.M. : 10

Registration No.:

Date

APR 10 2017

SECTION "A"

[20Q.×0.5=10marks]

Choose the most appropriate answer among the given choices

1. The shape of camber best suited for cement concrete pavements is
  - a) parabolic
  - b) straight line
  - c) elliptical
  - d) combination of straight and parabolic
2. Block cracking formed on the surface of the bituminous pavement is due to
  - a) improper mixing
  - b) improper compaction
  - c) temperature variation
  - d) heavy wheel load
3. Which of the following premix methods is used for base course?
  - a) Bitumen Bound Macadam
  - b) Bitumen Premixed Carpet
  - c) Asphalt Concrete
  - d) Mastic Asphalt
4. The drain which is provided parallel to roadway to intercept and divert the water from hill slopes is known as
  - a) sloping drain
  - b) catch water drain
  - c) side drain
  - d) cross drain
5. First operation during the detailed survey of a hill road is
  - a) fixation of B.M
  - b) hydrological and soil surveys
  - c) adjustment of alignment along with curves
  - d) derivation of longitudinal and cross-sections
6. The most suitable equipment for compacting black cotton soil is
  - a) vibrator
  - b) pneumatic tyred roller
  - c) smooth wheeled roller
  - d) sheep foot roller
7. Hill road are the one, which passes through the terrain with cross slope
  - a) 10 % or more
  - b) 15 % or more
  - c) 25 % or more
  - d) 60 % or more
8. Penetration test on bitumen is used for determining its
  - a) viscosity
  - b) ductility
  - c) adhesiveness
  - d) grade
9. The suitable gradient within which the engineer must endeavor to design the road is
  - a) ruling gradient
  - b) limiting gradient
  - c) exceptional gradient
  - d) mean gradient
10. The bridge having its floor flush with bed of stream is known as
  - a) causeway
  - b) culvert
  - c) viaduct
  - d) minor bridge



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Level : B.E.  
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Time : 2 hrs. 30 mins.

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Semester: I  
F.M. : 40

SECTION "B"

*Assume suitable data wherever necessary. CBR Design chart (fig 1) is provided along with question paper.*

- 1.a. Classify road networks as per Nepal Road Standards. Also mention the authorities responsible for maintenance, repair and rehabilitation of it. [3+1]
- b. Describe the elements of highway cross-section. Illustrate them with typical highway cross-sections. [2+2]
- 2.a. Explain the importance of hair pin bends in hill roads. Derive the expressions for design of different components of it. [1+3]
- b. Explain how the filter material is designed for use in sub-surface drainage system. [4]
- 3.a. Discuss the various typical failures in bituminous road and its causes with neat sketches. [4]
- b. Explain briefly the construction steps for cement concrete pavement. [4]
- 4.a. Discuss importance of super elevation. A radius of 250 m has to be provided at a locality due to site restrictions in a highway with design speed of 100 kmph. Design the super elevation. Should there be restriction in speed? [1+3]
- b. It is desirable to use following materials on sub-grade with CBR=4 % for different pavement layers: [4]
  - i. Sandy soil with CBR = 8 %
  - ii. Soil-kankar mix with CBR= 20 %
  - iii. Broken stone and gravel with CBR= 80 %Take minimum thickness of wearing course= 10 cm  
Design the pavement structural for commercial vehicles of 500 per day, with 10 % growth rate, construction period of 3 years and life period of 15 years.
5. Write short notes on (*ANY FOUR*) [4×2=8]
  - a. Components of bridge
  - b. Crushing test of aggregate
  - c. Collision diagram
  - d. Methods of spot speed measurement
  - e. Factors controlling highway alignment

