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**B.E./B.Tech (Full Time) DEGREE END SEMESTER EXAMINATION, NOV/DEC 2011  
CIVIL ENGINEERING BRANCH  
FIFTH SEMESTER (REGULATIONS 2008)  
CE 9305 – HIGHWAY ENGINEERING**

**Time : 3 Hours**

**Max Marks : 100**

**PART – A**

**(10 x 2 = 20 Marks)**

- 1) State the functions of Central Road Research Institute in road transportation.
- 2) State any two differences between conventional and modern methods of surveying.
- 3) Define ESWL.
- 4) What are the different types of Krebs?
- 5) Calculate the extra widening required for a pavement of 7.5m on a horizontal curve of radius 350m if the longer wheelbase of the vehicle on the road is 6.5m. Design speed is 100km/hr.
- 6) Draw the load distribution by a wheel load on a flexible and rigid pavement.
- 7) State the desirable properties of soil as a subgrade material.
- 8) What do you understand by single and tandem axle load?
- 9) State any two differences between Tar and bitumen.
- 10) Define the term Skid Resistance.

**PART – B**

**(5 x 16 = 80 Marks)**

- 11a. Explain with a neat diagram the cross sectional elements of urban roads **(16 marks)**
- 12 a.i Derive the expression for Overtaking Sight Distance. **(8 marks)**  
 ii Explain the PIEV theory. **(8 marks)**
- (OR)**
- 12 b.i. What do you understand by Off-Tracking? **(6 marks)**  
 ii. A two-lane road with a design speed of 90km/h has a curve of radius 240m. Calculate the following:  
 a) Superelevation when full lateral friction is developed.  
 b) Coefficient of friction if no superelevation is provided.  
 c) Equilibrium superelevation for the condition when the pressure on the inner and outer wheels will be equal.  
 Make suitable assumptions. **(10 marks)**
- 13 a. Design a Flexible Pavement for the construction of a new highway with the following data:  
 No of commercial vehicles as per last count – 1700 commercial vehicles  
 Period of construction – 3 years; Design Life – 15 years  
 Annual traffic growth rate – 8%; Design CBR of subgrade soil – 10%  
 Category of road – NH; 2 lane single carriageway **(16 marks)**
- (OR)**
- 13 b.i. Calculate the stress at the interior, edge and corner regions of the CC pavement using Westergaard's stress equation where wheel load 'P' = 6100kg. Pavement thickness h= 18cm. Modulus of subgrade reaction k = 6kg/cm<sup>2</sup>. Radius of contact area a = 15 cm<sup>2</sup>. **(8 marks)**
- ii. Discuss the following  
 a) Vehicle Damage Factor  
 b) Temperature Stress **(8 marks)**

14 a. What are the properties of subgrade soil and how will you assess its strength. (16 marks)

(OR)

14 b.i. Discuss the construction procedure of Water Bound Macadam Road. (8marks)

ii. Discuss the desirable properties of aggregates and bitumen in road constructions. (8marks)

15 a. Explain any two failures in flexible and rigid pavements. (16 marks)

(OR)

15 b. Explain the Pavement evaluation by the Benkleman beam method. (16 marks)