

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Model Question

Regular			
Level	BE	Full Marks	60
Programme	BCE	Pass Marks	24
Year/Part	III/II	Time	3Hrs.

Subject: Transportation Engineering II (ENCE 353)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt all questions.
- ✓ The figures in the margin indicate full marks.
- ✓ Assume suitable data if necessary.

- Two vehicles approaching at right angles, A from West and B from South, collide with each other. After the collision, vehicle A skids in a direction 51° North of West and vehicle B, 61° East of North. The initial skid distances of vehicles A and B are 39m and 21m respectively before collision. The skid distances of vehicles A and B after collision are 15m and 36m respectively. If the weights of vehicles B and A are 6 and 4.4 tonnes respectively, calculate the original speeds of the vehicles. Take average skid resistance as 0.55. [8]
- Describe highway capacity and its types. Explain the factors which affect capacity and level of service. [4+4]
- Explain the design factors to be considered in rotary intersection design. [6]
- The average normal flow of traffic on cross roads A and B during design period are 400 and 300 PCU per hour; the saturation flow values on these roads are estimated as 1450 and 1150 PCU per hour respectively. The all-red time required for pedestrian crossing is 12 sec. Design two phase traffic signal by Webster's method. [6]
- Differentiate between flexible pavement design and rigid pavement design. Describe Westergaard's concept for temperature stresses. [8]
- Explain with a neat diagram the characteristics of mass haul diagram, including free haul, over haul, economic haul, shrinkage and swelling factor. [8]
- What is pavement evaluation, list out the methods of structural evaluation? Describe the typical types of flexible pavement failures? [4+4]
- As per the table below, a pavement system with the resilient moduli, layer coefficient of surface course and drainage coefficients are provided. If predicted ESAL = 15×10^6 , R = 90%, $S_o = 0.4$, present serviceability index = 4.2 and terminal serviceability index = 2.7, select the thickness of D1, D2 and D3. [8]

$$a_2 = 0.249 \times \log_{10} E_b - 0.977$$

$$a_3 = 0.227 \times \log_{10} E_{sb} - 0.839$$

Layer	Resilient modulus	Layer / drainage coeff.	Thickness
Surface course	$E_1 = 450,000$ psi	$a_1 = 0.44$	D1
Base course	$E_2 = 25,000$ psi	$m_2 = 1.2$	D2
Sub-base course	$E_3 = 15,000$ psi	$m_3 = 1.2$	D3

Subgrade: $MR = 5000$ psi

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