Max. Marks: 75

L1

L2

L2

 $(5 \times 10M = 50M)$

L2

L3

CO₄

CO₅

CO₅

CO₁

CO₁

3M

2M

3M

10M

10M

ANURAG Engineering College

(An Autonomous Institution)

IV B. Tech I Semester Regular/Supplementary Examinations, Dec-2024

PAVEMENT DESIGN (CIVIL ENGINEERING)

Time	3	Hours
- i ime:		HOUIS

Section – A (Short Answer type questions)		(25 Marks)	
Answer All Questions	Course Outcome	B.T Level	Marks
1. What are functions of each layer in flexible pavement?	CO1	L1	2M
2. Differentiate between tire and contact pressure.	CO1	L2	3M
3. What are properties of viscoelastic material?	CO2	L1	2M
3. What are properties of viscociastic materials.	CO2	L1	3M
4. List Burmister theory assumptions.	CO3	L2	2M
5. Mention the critical condition of stresses for a combination for in rigid pavement during winter.	CO3	L2	3M
6. Summarize the effect of temperature and moisture in rigid	CO3	LZ	2141
pavement. 7. Mention the limitation in empirical methods of flexible pavement	CO4	L2	2M
design.	004	т 1	31/

Section B (Essay Questions)

Answer all questions, each question carries equal marks.

With a neat sketch explain the functions of different layers of a flexible and rigid pavement.

8. List any three benefits of Pavement Design Based on M-E Method.

10. What is the preferred placement of construction joints in rigid

9. What is the effect stress ratio beyond 0.45 in rigid pavement?

pavements?

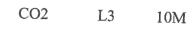
Calculate design repetitions for 20 years period for various wheel B) loads equivalent 2268 kg wheel load using the following traffic survey data on a four-lane road.

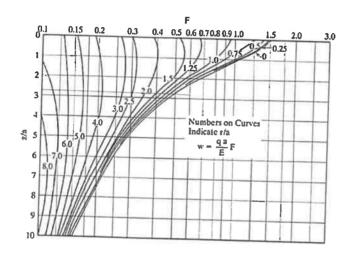
Wheel load kg	Average daily traffic (both directions)	Percentage of Total traffic volume
2268	Total volume	13.17
2722	(Considering Traffic	15.30
3175	growth) 215	11.76
3629		14.11
4082	7	6.21
4536		5.84

Determine the thickness required for a flexible pavement to sustain 12. A) a wheel load of 22500 kg with a tyre pressure of 14 kg/cm² by Burmister's two layered system. A plate load test was conducted on subgrade soil and for 0.125cm deflection, the unit pressure on 75cm plate was found to be 0.8kg/cm². On a test section of base course 15 cm thick the pressure on the plate was found to be 2.1 kg/cm² for the deflection of 0.125 cm.

L3 10M CO₂

B) A dual wheel load assembly with 76 kN load on each wheel and contact pressure of 0.8 N/mm² is applied on a homogenous mass with modulus of elasticity 11.8 N/mm². If the centre-to-centre distance between the two wheels is 580 mm, determine the deflection value at a depth of 0.5 m at four points, at the centre of dual wheels, and at radial distance of 300, 600 and 900 mm from this centre along the line joining centres of the two-wheel loads. Use deflection chart





Using the data given below, calculate the wheel load stresses at 13. A) i) interior, ii) edge and iii) corner regions of a cement concrete pavement using Westergaard's stress equations. Also determine the probable location where the crack is likely to develop due to corner loading.

Wheel load, P = 5100 kg;

Modulus of elasticity of cement concrete, $E = 3.0 \times 10^5 \text{kg/cm}^2$

Pavement thickness, h = 18 cm;

Poisson's ratio of concrete, $\mu = 0.15$

Modulus of subgrade reaction, $K = 6.0 \text{ kg/cm}^3$

Radius of contact area, a = 15 cm.

Explain the stress development in rigid pavement due to loading, B) friction and critical locations of wheel loads on a rigid pavement.

CO₃ L2

CO₃

14. A) What is the need for field drainage. Explain about Sub-surface drainage systems.

CO₄ L3 10M

L3

10M

10M

OR Explain about i) Surface drainage systems ii) Vertical drainage. B)

CO₄ L2 10M

Explain about the factors affecting rigid pavement design. 15. A)

CO₅ L2 10M

OR Briefly outline the IRC recommendations for determining the: B) i) thickness of slab ii) Expansion joints

CO₅ L3 10M

iii) design of dowel bars

iv) contraction joint.

Note: Allow the Code Book IRC 37 & IRC 58.