BACHELOR OF ENGINEERING (CIVIL ENGINEERING) EXAMINATION 2024
[Third Year; Second Semester]
Transportation Engineering - I

Total Time: Three Hours

Full Marks 100
(Part I: 50 + Part II: 50)

Use a separate Answer-Script for each part

Part I (50 Marks)

Answer All in brief and to the point. Assume any reasonable data if required but not provided.

1. The following table is the sieve analysis report of 5000 gm aggregates (Cumulative Percent Retain vs. Sieve Size) of an Impact Value Test. Note that the required fraction of aggregates is received from the sieve analysis only (marked as 'Before Test'). After the test, the fractured aggregates were mixed with the remaining intact aggregates and sieved again. The second sieve analysis result is marked with 'After Test'. Determine and Report the Impact Value of the aggregate.   (10)

Cumulative Percent Weight Retained														
Sieve Size (mm)	40	26.5	19	16	13.2	12.5	10	4.75	2.36	1.18	0.6	0.3	0.15	0.075	Pan
Before Test	0	3.18	19.44	41.44	65.88	82.3	92.24	96.8	98.84	99.92	99.98	100	100	100	100
After Test	0	3.18	19.44	41.44	65.88	82.3	93.04	95.38	97.8	99.66	99.92	99.98	100	100	100

2. For CBR test, the soil is expected to be compacted as per the MDD & OMC received from the Modified Proctor Test. Calculate the No. of Blows required to compact the soil in CBR mould to achieve a similar MDD, corresponding to the OMC obtained for the Modified Proctor Test.   (10)

    The following are a few data that may help to determine the above:

    Volume of the Proctor mould = 944 cc; Volume of CBR Mould = 2250 cc

    Available Hammer weights = 2.5 kg and 4.55 kg; Possible Hammer Height of falls = 300 mm and 450 mm

3. Derive, in detail, the required expressions for SSD and OSD with neat sketches. Consider the necessary reasonable data/assumptions whenever required.   (10)

4. Briefly describe the 'Cross-Section Elements of a Highway' with a neat sketch.   (10)

5. Mention different tests conducted on Bitumen before selecting it for application. Justify each test result toward the proper functioning of bituminous pavement.   (10)

[Turn over

**BACHELOR OF ENGINEERING (CIVIL ENGINEERING) THIRD YEAR
SECOND SEMESTER EXAM 2024**

TRANSPORTATION ENGINEERING – I
Part – II (50 Marks)

Answer Part I and Part II in Separate Answer Scripts

Time: 3 Hours   Full Marks:100

Answer Question No. 1 and Two from the rest
Answer brief & to the point.
Assume standard value for any parameter, if required

1. Briefly explain **any six** of the following   6 x 5
   a. Jayakar Committee, its recommendations and subsequent actions
   b. Capacity and its types as per HCM 1950
   c. Level of Service and its application
   d. Classification of Indian Non-Urban Highways as per different Indian Road Development Plans
   e. Cant deficiency and Cant excess
   f. Railway gauges in India and major factors influencing its choice
   g. Sleeper Density
   h. Characteristics of a good ballast

2. Calculate the superelevation and the maximum permissible speed for a 4° BG transitioned curve on a high-speed route with a maximum sanctioned speed of 110 km/h. The speed for calculating the equilibrium superelevation as decided by the chief engineer is 70 km/h and the booked speed of goods trains is 35 km/h. The permissible cant excess and cant deficiency may be considered as 75mm and 100mm respectively   10

3. A BG branch line track takes off as a contrary flexure through a 3° from a main line track of a 2° curvature. Due to the turnout, the maximum permissible speed on the branch line is 20 km/h. Calculate the negative superelevation to be provided on the branch line track and the maximum permissible speed on the main line track (when it takes off from a straight track)   10

4. The design flow, mean free speed and average vehicle length on a roadway are 1500 veh/hr, 80KmpH and 5.0m respectively. Determine the required number of lanes for the following cases –
   a. Under basic capacity condition   4
   b. Under LoS C condition with design speed as 75% of mean free speed and maximum permissible flow capacity ratio of 0.25   6