Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8=50, will be treated as malpractice.

ONE TIME EXIT SCHEME

| | 1 pm | / | | | | THE PERSON NAMED IN COLUMN | 4.7 |
|-----|------|---|--|------|------|--------------------------------------|-----|
| USN | | | | | | CMRIT LIBRARY BANGALORE - 560 037 | 10 |

Fifth Semester B.E. Degree Examination, April 2018 Transportation Engineering - I

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.

2. Any missing data can be suitably assumed.

PART - A

1 a. Briefly explain the role of transportation for the development of rural areas in India.

(06 Marks)

V56

- b. Explain briefly the contribution of the following to the development of Road network in India: i) Jayakar Committee ii) Central Road Fund. (08 Marks)
- c. Compare Roadways and Railways in detail.

(06 Marks)

2 a. Write a note on: i) NHDP ii) Road Development plan - vision 2021. (08 Marks)

b. Four new road links A, B, C and D are to be constructed during a Five year period. Suggest the order of priority for phasing the road construction programme based on maximum utility approach. Assume utility units of 0.5, 1.0, 2.0 and 4 for the four population ranges and 1 per 1000 tonnes, 500 tonnes and 100 tonnes of agricultural, raw material and industrial products respectively.

(08 Marks)

LIBKAT K-5600

| Road | Length | No. of villages served with Productivity served in tonnes | | | | | | | |
|------|--------|---|---------------|--------|------|--|----------|------------|--|
| link | km | population range | | | | The state of the s | | | |
| | | < | 501 < | 1001 - | > | Agricultural | Raw | Industrial | |
| | | 500 | 1000 | 2000 | 2000 | T TAN | material | products | |
| A | 80 | 25 | 20.5 | 7 | 4 | 8000 | 4000 | 1000 | |
| В | 55 | 35 | \\\\ 8 | 5 | 5 | 6000 | . 1000 | 1600 | |
| С | 75 | 45 | 9 | 3 | 3 | 4500 | S2000 | 3200 | |
| D | 70 | 55 | 5 | 2 | 6 | 4000 | 6000 | 1000 | |

e. Explain briefly various planning surveys to be conducted.

(04 Marks)

- a. Explain briefly various factors governing the geometric design of highway. (08 Marks)
 - b. List the objects of providing Camber. Why steep Camber should be avoided? (06 Marks)
 - c. Calculate the safe overtaking sight distance on a highway catering to 2 way traffic for a design speed of 65 kmph. A = 3.25 kmph/sec. Assume other data as per IRC standards. (06 Marks)
- 4 a. List the objects of providing: i) Transition curve ii) Super elevation on horizontal curve. (06 Marks)
 - b. While aligning a hill road with a ruling gradient of 6 percent, a horizontal curve of radius 60m is encountered. Find the grade compensation and the compensated gradient at the curve.

 (06 Marks)
 - c. An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. A summit curve is to be designed for a speed of 80 kmph so as to have an overtaking sight distance of 500m.

 (08 Marks)

1 of 2 CMRIT LIBRARY BANGALORE - 560 037

BANGALORE - 560 037

PART - B

a. Discuss briefly the various properties of Bitumen and the tests to be conducted 5

b. A plate load test was conducted in soaked subgrade during monsoon season using a plate of diameter 30cm. The load values corresponding to the mean settlement dial readings are given below: Find the modulus of subgrade reaction for the standard plate, if one division of the load. (08 Marks)

| Mean settlement values in mm | 0 | 0.24 | 0.52 | 0.76 | 1.02 | 1.23 | 1.53 | 1.76 |
|------------------------------|---|------|------|------|------|------|------|------|
| Load values in divisions | 0 | 110 | 210 | 280 | 320 | 350 | 380 | 390 |

Dial indicates 4.2kg.

c. Discuss the importance of soil subgrade as highway material.

(06 Marks)

- a. Explain the meaning of ESWL. How is it determined for a dual wheel assembly and what 6 are its applications? (06 Marks)
 - b. Calculate the warping stresses at interior, edge and corner regions in a 25cm thick concrete pavement with transverse joints at Nm interval and longitudinal joints at 3.6m interval. The modulus of subgrade reaction is 6,9kg/cm³. Assume temperature difference for day conditions to be 0.6°C per cm of slab thickness. Assume radius of loaded area as 15cm. $C_X = 1.03$, $C_Y = 0.55$, $E = 3 \times 10^5 \text{ kg/cm}^2$, $\mu = 0.15$. (08 Marks)

What are the factors governing design of pavements? Explain significance of each.

(06 Marks)

- 7 Write the specifications for materials and step by step procedure for construction of Water bound Macadam Base. (08 Marks)
 - b. Briefly explain the steps for design of filter material is subsurface drainage system.

(06 Marks)

c. Briefly explain the functions of embankment and list the design elements of highway embankment. (06 Marks) **CMRIT LIBRARY**

a. The detail of three alternate proposals for strengthening of a highway pavement are given 8 below. Determine which one is more economical, if its rate of interest payable in all the cases is 10% per annum and there is an average of 3000 vehicles per day.

| S.No | Overlay | Design | Construction | Maintenance cost | VOC |
|------|-----------|----------|--------------|------------------|--------------|
| | type | life yrs | cost | (Rs/km during | (Rs/veh – |
| | The stand | | (lakhs/km) | design life) | km during |
| | | | | | design life) |
| 1 | WBM+ | 5 | 4.5 | 15,000 | 1.52 |
| | PMC | | | | 492 |
| 2/ | BM + PMC | 8 | 6.8 | 10,000 | 1.45 |
| 3.4 | BM + AC | 12 | 9.2 | 6,000 | 1.35 |

b. Write a note on Net present value method.

(06 Marks)

What are the factors considered for evaluation of vehicle operation cost?

(08 Marks)

CMRIT LIBRARY BANGALORE - 560 037
