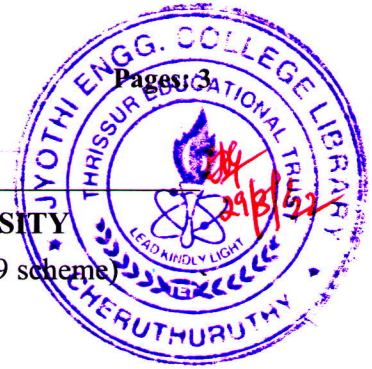


Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Fourth Semester B.Tech Degree Examination June 2022 (2019 scheme)

**Course Code: CET206****Course Name: TRANSPORTATION ENGINEERING**

Max. Marks: 100

Duration: 3 Hours

**PART A***(Answer all questions; each question carries 3 marks)*

Marks

- |    |                                                                                                         |     |
|----|---------------------------------------------------------------------------------------------------------|-----|
| 1  | What are the special considerations to be taken while aligning roads on hilly areas?                    | (3) |
| 2  | What is camber? How it is provided on roads? List the factors affecting the amount of camber on a road. | (3) |
| 3  | Differentiate between tack coat and prime coat.                                                         | (3) |
| 4  | Write any three desirable properties of bitumen to be used in pavement construction?                    | (3) |
| 5  | What is the significance of passenger car unit in traffic studies?                                      | (3) |
| 6  | Discuss the advantages and disadvantages of rotary intersections                                        | (3) |
| 7  | Draw the layout of an artificial harbour and label its various elements                                 | (3) |
| 8  | What is coning of wheels? Why it is necessary?                                                          | (3) |
| 9  | Distinguish between runway and taxiway.                                                                 | (3) |
| 10 | What is wind rose diagram? Explain its uses.                                                            | (3) |

**PART B***(Answer one full question from each module, each question carries 14 marks)***Module -1**

- |    |                                                                                                                                                                                                                 |     |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 11 | a) Derive an equation for equilibrium superelevation. Determine the superelevation required for a horizontal curve of radius 300m with a design speed of 80kmph under mixed traffic condition in an urban area. | (7) |
|    | b) Define stopping sight distance (SSD). List the factors affecting stopping distance. Derive an expression for SSD on level roads.                                                                             | (7) |
| 12 | a) A valley is formed by a descending grade of 1 in 25 meeting an ascending grade of 1 in 30. Design the length of valley curve to fulfill both comfort condition and                                           | (7) |

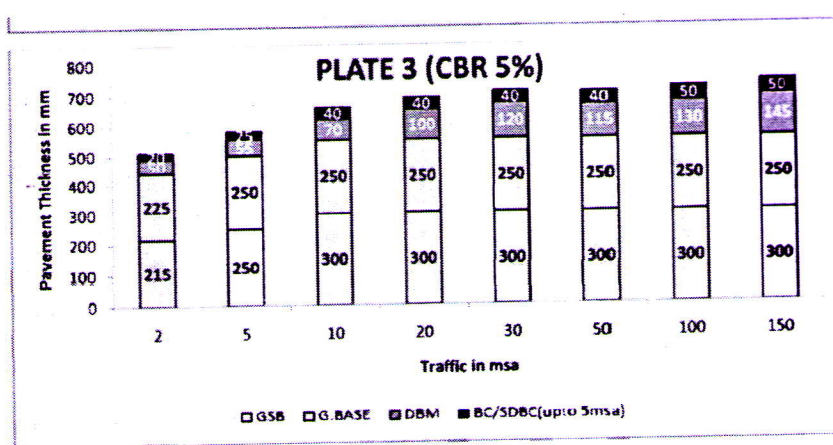
head light distance requirements for a design speed of 60 kmph. Assume allowable rate of change of centrifugal acceleration is  $0.6 \text{ m/sec}^3$ .

- b) Why transition curves are provided on a horizontal curve? What are the requirements of an ideal transition curve? How do you determine the length of transition curves? (7)

**Module -2**

- 13 a) Define CBR. Design a flexible pavement for the construction of a new highway with the following data: (7)

Category of road - four lane dual carriage way, number of commercial vehicles in the year of completion of construction = 2400 CVPD per direction, design life = 15 year, annual growth rate of vehicles = 5%, design CBR value of soil subgrade = 5%, vehicle damage factor = 3.5, lane distribution factor = 0.75



- b) State the major differences between flexible and rigid pavements. (7)
- 14 a) Describe the specifications of materials and construction steps of granular sub-base course. (7)
- b) List out the properties of aggregates to be used in pavement construction. (7)  
Describe any two test for judging the suitability of aggregates.

**Module -3**

- 15 a) Explain various Levels of Services (LOS) as per HCM. What are the factors affecting capacity and LOS? (7)
- b) A fixed time 2 phase signal is to be provided at an intersection having a N-S and E-W road where only straight ahead traffic is permitted. The hour flows are given in the table. Calculate the optimum cycle time and green time for the minimum overall delay. The integration time should be the minimum necessary (7)

for efficient operation. The time lost per phase due to starting delays can be assumed to be 2 seconds. The value of the amber period is 2 seconds. Sketch the timing diagram for each phase.

	N	S	E	W
Design hour flow (q) in PCUs/ hour	800	400	750	1000
Saturation flow (s) in PCUs/ hour	2400	2000	3000	3000

- 16 a) Explain how spot speed data are presented and the results used in traffic engineering. (7)
- b) List the various devices used in traffic controlling and their general requirements. (7)  
What are the different systems of traffic signal coordination?

#### Module -4

- 17 a) Draw the cross section of a permanent way on an embankment. List the component parts of a railway track and explain their function. (7)
- b) List the different types of breakwaters. What factors would guide the selection of a particular type? (7)
- 18 a) List and explain the different stages of setting out of centreline of tunnels. (7)
- b) What are docks? Differentiate between dry dock and wet dock. (7)

#### Module -5

- 19 a) Explain with sketches, the basic patterns of runway configurations. (8)
- b) Draw the layout of a typical airport and label the different components. Explain the functions of (a) Aprons (b) Hangars. (6)
- 20 a) The runway length required for landing at sea level in standard atmospheric conditions is 3000m. Runway length required for take-off at sea level in standard atmospheric condition is 2500m. Aerodrome reference temperature is 25 °C and that of the standard atmosphere at aerodrome elevation of 150m is 14.025 °C. If the effective runway gradient is 0.5 percent, determine the runway length to be provided. (8)
- b) Explain any six site selection criteria related with the airport site selection. (6)

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