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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKE-UP EXAMINATION - JULY 2024

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|  | Date :22-07-2024 |
| Course Code : CIV2016 | Time : 1:30 PM to 4:30 PM |
| Course Name :Transportation Engineering | Max Marks : 100 |
| Program :B.tech | Weightage :50 |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 4 QUESTIONS 4Q X 5M=20M** | | | |
| 1 | List the factors which control highway alignment. | (CO 1) | [Knowledge] |
| 2 | Define Highway alignment and list the disadvantages of improper highway alignment | (CO 1) | [Knowledge] |
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| 2 | What are the important surface characteristics of a pavement? Discuss these in detail | (CO 1) | [Knowledge] |
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| 3 | Define the following  a) Stopping sight distance b) Over taking sight distance | (CO 2) | [Knowledge] |
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| 4 | Define the following components of highway  a) Camber b) Shoulder | (CO 2) | [Knowledge] |
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| 5 | Explain the purpose of the following components of airport   1. Runway b) Hanger | (CO 3) | [Knowledge] |
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| 6 | Explain the purpose of the following components of a railway track   1. Sleepers b) Rails | (CO 3) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 7 | Aggregates are raw materials that are produced from natural sources and extracted from pits and quarries, including gravel, crushed stone, and sand Explain the desirable properties of aggregates to be used in pavement construction | (CO 1) | [Comprehension] |
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| 8 | Railway engineering is a multi-faceted engineering discipline dealing with the design, construction and operation of all types of rail transport systems. Discuss the functions of different components of a railway track | (CO 3) | [Comprehension] |
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| 9 | An airport is a facility where passengers connect from ground transportation to air transportation. Discuss the functions of different components of an Airport | (CO 3) | [Comprehension] |
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| 10 | A vertical summit curve is to be designed when two grades, +1/60 and -1/70 meet on a highway. The SSD and OSD required are 150 and 600 m respectively. But due to the site conditions the length of the vertical curve has to be restricted to a maximum value of 500m if possible. Calculate the length of the summit curve needed to fulfil the requirements of SSD, OSD or at least ISD | (CO 2) | [Comprehension] |
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| 11 | Design the length of valley curve formed by a descending grade of 1 in 40 meeting an ascending grade of 1 in 25. The curve has to fulfill both comfort condition and head light sight distance requirements for a design speed of 60kmph. Assume allowable rate of change of centrifugal acceleration is 0.55 m/s3. | (CO 2) | [Comprehension] |
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| 12 | In order to decide the suitability of the aggregate for use in pavement construction, following tests are carried out:   * Crushing test * Abrasion test * Impact test * Soundness test * Shape test   Identify and explain the test procedure for the tests used to determine the toughness and hardness of an aggregates in laboratory. | (CO 1) | [Comprehension] |
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| 13 | Bitumen is a black viscous mixture of hydrocarbons obtained naturally or as a residue from petroleum distillation. Briefly explain Bitumen emulsion and cutback bitumen along with their application. | (CO 1) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** | | | |
| 14 | Determine the length of the transition curve using the following data:  Radius of circular curve= 250 m  Allowable rate of super elevation= 1 in 120  Design speed= 80 kmph  Pavement width including extra widening = 7 m  Pavement rotated about the centre line of the payment | (CO 2) | [Application] |
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| 15 | The radius of a horizontal curve is 100 m. The design speed is 60 Kmph and the design coefficient of lateral friction is 0.15.  a) Calculate the super elevation required if full lateral friction is assumed to develop  b) Calculate the coefficient of friction needed if no super elevation is provided | (CO 2) | [Application] |
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| 16 | Calculate the safe overtaking distance for the speeds of overtaking vehicle and overtaken vehicles are 96 kmph and 80kmph respectively. The average acceleration during overtaking may be taken as 0.99 m/s2.  i) Calculate the safe overtaking sight distance , ii) What is the minimum length of overtaking zone | (CO 2) | [Application] |