**18CE604**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | | | | | | | |
| **June, 2022** | | | | **Civil Engineering** | | | | | |
| **Sixth Semester** | | | | **Highway Engineering** | | | | | |
| **Time:** Three Hours | | | | | **Maximum: 5**0 Marks | | | | |
| *Answer Question No. 1 Compulsorily.* | | | | | | (10X1 = 10 Marks) | | | |
| *Answer* ***ANY ONE*** *question from each Unit.* | | | | | | (4X10=40 Marks) | | | |
| 1. | a) | Define IRC and CRRI | | | | **CO1** | |  |
|  | b) | List out various road network patterns | | | | **CO1** | |  |
|  | c) | Define Super Elevation | | | | **CO1** | |  |
|  | d) | Define ruling gradient | | | | **CO1** | |  |
|  | e) | Define Camber | | | | **CO1** | |  |
|  | f) | List out various factors controlling alignment | | | | **CO1** | |  |
|  | g) | Define toughness of aggregate | | | | **CO3** | |  |
|  | h) | Define and sketch Alligator cracking | | | | **CO3** | |  |
|  | i) | Define Space mean speed and Time mean speed | | | | **CO2** | |  |
|  | j) | List out the uses of spot speed studies | | | | **CO2** | |  |
| **Unit - I** | | | | | | | | |
| 2. | a) | Explain in detail various Engineering surveys to be conducted. | | | | **CO1** | **5M** | |
|  | b) | Write a detailed note on history of road plan with particular reference to India | | | | **CO1** | **5M** | |
|  |  | **(OR)** | | | |  |  | |
| 3. | a) | A vertical summit curve is to be designed when two grades +1/50 and -1/80 meet on a highway. The stopping and over taking sight distance are 200m and 440m respectively. Calculate the length of summit curve needed to fulfil the requirements of a) SSD) OSD | | | | **CO1** | **5M** | |
|  | b) | Derive an expression for mechanical widening with a neat sketch | | | | **CO1** | **5M** | |
| **Unit - II** | | | | | | | | |
| 4. | a) | The average normal flow of traffic on crossroads A and B during the design the period is 400 and 250 PCU per hour, the saturation flow values on these roads are estimated as 1850 and 1400 PCU per hour respectively. The all- red time required for pedestrian crossing is 16 seconds. Design a two- phase traffic signal by Webster’s method? | | | | **CO2** | **5M** | |
|  | b) | Discuss various road user characteristics that influence traffic flow in detail | | | | **CO2** | **5M** | |
|  |  | **(OR)** | | | |  |  | |
| 5. | a) | What are the design elements of a rotary? Explain | | | | **CO2** | **5M** | |
|  | b) | State various methods of conducting origin and destination studies in detail | | | | **CO2** | **5M** | |
| **Unit - III** | | | | | | | | |
| 6. | a) | Explain the penetration test with a neat sketch. | | | | **CO3** | **5M** | |
|  | b) | Compare various aspects of flexible and rigid pavement | | | | **CO3** | **5M** | |
|  |  | **(OR)** | | | |  |  | |
| 7. | a) | Calculate the stresses in cement concrete pavement using westergaard equations with the following data  • Wheel load (P) =4500 kg  • Modulus of elasticity of cement concrete (E) =3x10^5 kg/cm2  • Pavement thickness (h) =18cm  • Modulus of sub grade reaction (k)=6.0 kg/cm3  • Radius of contact area (a)=15cm | | | | **CO3** | **5M** | |
|  | b) | Explain the concept of ESWL with a neat sketch. | | | | **CO3** | **5M** | |
| **Unit - IV** | | | | | | | | |
| 8. | a) | Discuss in details various steps involved in the construction of embankment for a pavement | | | | **CO4** | **5M** | |
|  | b) | Explain various steps involved in the construction of Dense bituminous macadam | | | | **CO4** | **5M** | |
|  |  | **(OR)** | | | |  |  | |
| 9. | a) | Explain the construction procedure of cement concrete road. | | | | **CO4** | **5M** | |
|  | b) | Explain typical flexible pavement failures | | | | **CO4** | **5M** | |

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