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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## October 2024 Supplementary Examinations

**Programme: B.E.** **Semester: VI**
**Branch: Civil Engineering** **Duration: 3 hrs.**
**Course Code: 22CV6PCTSE** **Max Marks: 100**
**Course: Transportation Systems Engineering**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.





| | | | CO | PO | Marks |
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| | | **UNIT – I** | | | |
| 1 | a) | Highlight the importance of Indian Railways in development of the nation. | *CO* 1 | *PO1* | **06** |
| | b) | Discuss in detail, the factors controlling the alignment of a railway track. | *CO* 1 | *PO1* | **07** |
| | c) | Mention the basic functions and requirements for ballast used in the permanent way. | *CO* 1 | *PO1* | **07** |
| | | **UNIT – II** | | | |
| 2 | a) | Discuss the various measures to be adopted for the upgradation or modernization of existing tracks to high-speed tracks. | *CO* 1 | *PO1* | **10** |
| | b) | A locomotive with four pair of driving wheels is required to haul a train at a speed of 80 kmph. The train is made on a straight level track with an axle load of driving wheels of the engine 22.84 tonne; calculate the maximum permissible load that can be pulled by the engine. If the train has to ascend a slope of 1 in 200, how much reduction in speed should be made from the original speed? | *CO* 2 | *PO1, 2* | **10** |
| | | **UNIT - III** | | | |
| 3 | a) | Explain the necessity of gradients. Discuss the different types of gradients stating the permissible values adopted on Indian Railways. | *CO* 2 | *PO1* | **10** |
| | b) | A 6 degree curve branches from a 3 degree main curve in the opposite direction in the layout of a B.G yard. If the speed on the branch line is limited to 36 kmph, determine the speed restriction on the main line with the provision of complete cant deficiency. | *CO* 2 | *PO1,2* | **06** |
| | c) | Explain the concept of grade compensation on curves of the railway alignment. | *CO* 2 | *PO1* | **04** |
| | | **OR** | | | |

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| | 4 | a) | Calculate the maximum permissible speed on a curve of high speed B.G track having the following particulars:<br>i. Degree of the curve = $2^0$<br>ii. Amount of Superelevation = 8 cm<br>iii. Length of the transition curve = 150 m<br>iv. Maximum speed of the section likely to be sanctioned = 168 km.p.h. | ***CO*** 2 | ***PO1,2*** | **10** |
| | | b) | Explain the significance of geometric design of a railway track. | ***CO*** 2 | ***PO1*** | **06** |
| | | c) | List out the different types of horizontal curves. Also, discuss the necessity of provision of curves. | ***CO*** 2 | ***PO1*** | **04** |
| | | | **UNIT – IV** | | | |
| | 5 | a) | Explain the various factors that affect the location of exit taxiway. Discuss the concept of optimal location of exit taxiway. | ***CO*** 2 | ***PO1*** | **08** |
| | | b) | The length of a runway under standard conditions is 2000 m. The airport is to be provided at an elevation of 430 m above the mean sea level. The airport reference temperature is $32^0$C. The construction plan provides the following data:<br>**End to end of runway (m) — Grade (%)**<br>0 to 500 — + 1.00<br>500 to 1000 — - 0.5<br>1000 to 1500 — + 0.5<br>1500 to 2000 — +1.00<br>Determine the length of the runway after applying corrections for elevation and temperature as per ICAO and for gradient as per FAA specifications. | ***CO*** 2 | ***PO1,8*** | **12** |
| | | | **OR** | | | |
| | 6 | a) | Explain in detail the influence of the aircraft design on the geometrics of the runway. | ***CO*** 2 | ***PO1*** | **08** |
| | | b) | With an illustration briefly discuss the different components of an airport. | ***CO*** 1 | ***PO1*** | **04** |
| | | c) | For a Class A airport, an exit taxiway joins a runway and a parallel main taxiway. The total angle of turn is 25 degrees and turn off speed is 95 kmph. The entrance curve radius for a speed of 95 kmph is 941 m and separation clearance are 198.70 m.<br>Design all the components of the exit taxiway. | ***CO*** 2 | ***PO1*** | **08** |
| | | | **UNIT – V** | | | |
| | 7 | a) | Discuss the classification of tunnels based on different categories. | ***CO*** 3 | ***PO1*** | **06** |
| | | b) | Explain the different natural phenomena and briefly discuss their effect of these phenomena on the harbor design. | ***CO*** 3 | ***PO1*** | **08** |
| | | c) | Highlight the safety precautions to be followed during the tunnelling procedure. | ***CO*** **3** | ***PO6*** | **06** |



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