

<b>Name:</b>	
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, December 2020**

**Course: Safety in Rail and Road Transport**  
**Program : B Tech FSE**  
**No of pages: 2**  
 Course Code: HSFS 4003

**Semester: VII**  
**Time: 03 hrs.**  
**Max. Marks: 100**

**SECTION A**

S. No.		30 Marks	CO
Q 1	Enumerate the various stresses induced on rails of a permanent way	5	CO1
Q 2	List out the various gauges prevailing in India with their gauge widths. What factors govern the selection of a suitable gauge?	5	CO1
Q 3	Define 'creep of rail'. What are its causes and effects?	5	CO3
Q 4	What are advantages of CMS crossings over built up crossing?	5	CO4
Q 5	Define the following terms <ul style="list-style-type: none"> <li>• Camber</li> <li>• Carriage Way</li> <li>• Kerbs</li> <li>• Shoulders</li> <li>• Super Elevation</li> </ul>	5	CO5
Q 6	Brief milestones in Indian roadways construction.	5	CO5

**SECTION B**

Q 7	Draw a typical cross section of a permanent way. Explain briefly the functions of the various components of the railway track.	3+7	CO1
Q 8	Calculate the super elevation (Cant) and the maximum permissible speed for a 2° standard gauge transitioned curve on a high-speed route with a maximum sanctioned speed of 110 km/h. The speed for calculating the equilibrium super elevation as decided by the chief engineer is 80 km/h and the booked speed of goods trains is 50 km/h.	6+4	CO2

Q 9	Discuss the classification and specifications of traffic signs as per Indian Roads Congress, (IRC) 67 standard.	10	CO3
Q 10	Describe the components of a right-hand turnout taking off from a straight broad gauge track and name various components and important terms connected with the layout	10	CO4
Q 11	Give the analysis of “Super Elevation” to be considered in highway design.	10	CO5
<b>SECTION-C: Answer the following.</b>		<b>20 Marks</b>	
Q 12	Discuss the steps involved in attainment of super elevation in highways.	20	CO5