

Name:

Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**Online End Semester Examination, May 2021**

**Programme Name:** B. Tech Civil Engineering

**Course Name :** Railway Engineering

**Course Code :** CIVL3046

**Nos. of page(s) :** 02

**Semester : VI**

**Time : 03 hrs**

**Max. Marks : 100**

**SECTION A**

1. Each Question carries 5 Marks

2. Instruction: Complete the statement / Select the correct answer(s)

S. No.		Marks	CO
Q 1	List down five important aspects of modernization of Indian Railways from various sectors of its planning, design and operations.	5	CO1
Q 2	Explain five important aspects of functions of railways ballast, which is required for normal rail operations.	5	CO1
Q 3	List down the five harmful effects of a bad Rail joints such that they are treated as a necessary evil despite the integral part of the rail network.	5	CO2
Q 4	Why we need elastic fastening in future in railways. List down the key requirements of an elastic fastening.	5	CO2
Q 5	Define grade-compensation on curves in Indian Railways. Find the steepest gradient on a $2^0$ curve for a BG line with a ruling gradient of 1 in 250.	5	CO3
Q6	List down and briefly explain types of types of gradients used in Indian Railways.	5	CO4

**SECTION B**

1. Each question carries 10 marks.

2. Instruction: Write short / brief notes and draw diagrams where necessary.

Q 7	Highlight the various types of forces acting on the Railways Tracks, which causes heavy stresses in the permanent-way system.	10	CO1
Q 8	Calculate the minimum theoretical length of LWR beyond which the central portion of rail would not be subjected to any thermal expansion. <b>Assume the following data:</b> a) Standard cross-sectional area of a 52 kg rail section = $66.15 \text{ cm}^2$ b) Coefficient of thermal expansion of rail steel = $11.5 \times 10^{-6}$ per $^0\text{C}$ , c) Temperature variation = $32^0\text{C}$ , d) Modulus of elasticity of rail steel = $2 \times 10^6 \text{ kg/cm}^2$ , sleeper spacing = 70 cm, e) Average restraining force per sleeper per rail = 320 kg.	10	CO2

Q 9	Calculate the super-elevation and maximum permissible speed for a $3^0$ curve on a high-speed BG section with a maximum sanctioned speed of 110 kmph. Assume the equilibrium speed to be 80 kmph and the booked speed of the goods train to be 50 kmph.	10	CO3
Q 10	Explain the importance and key components of the POINTS & CROSSING systems. Differentiate between the principles of how a point works differently than a crossing system to enable track directional change of the train.	10	CO3
Q 11	List down the key objectives of signalling of the Indian Railways System. Explain the principle behind the Semaphore signal and its applicability continuously during day and night  <b><u>OR</u></b> Briefly explain the Principle of track circuiting for much needed safety of high-speed trains. Differentiate between two different types of track circuiting operations undertaken in Indian Railways.	10	CO4
<b>SECTION-C</b>			
1. Each question carries 20 marks 2. Instruction: Write detailed answers and draw diagrams, where necessary.			
Q 12	Explain two different definitions of High-speed train as explained by the International Union of Railways (UIC). Highlight various important technological upgradation, which are required to enable high-speed train operations on Indian Railway tracks.  <b><u>OR</u></b> <b>Write notes on following:</b> A. Type of Crossings – Level Crossing, Road Under Bridge, Road Overbridged and their importance to allow smooth cross movement of Road and Railways together.  B. Underground Railways and its Advantages and Limitations in Indian Urban Context.	20	CO4