Course No: CE F425   **Date: 02-04-2022 [12:00 Noon start]**
Duration: 90 Mins (Closed book)   **Max. Marks: 70**

Fill up the blanks: **[10 x 1 = 10]**

1) Railway board has classified the Indian Railway lines on the basis of importance of route, traffic carried and maximum permissible speed on the routes (True/False)

2) Group A lines are the trunk routes with speed 130 kmph or more (True/False)

3) _____ machine which transfers chemical energy of fuel into mechanical energy of motion.

4) If the surface is very smooth, the coefficient of friction will be very low (True/False)

5) WAP stands for _____

6) Heavier axle loads require strong track structure (True/False)

7) Rail is assumed to be a beam on an elastic foundation (True/False)

8) UIC stands for _____

9) The pressure on the subgrade depends not only on the total quantum of the load but also on the manner in which it is transferred to the subgrade (True/False)

10) Rail weld is a known source of weakness in track structure and is to be avoided. (True/False)

Short answers: **[10 x 3 = 30]**

1) What are the various types of train resistances?

2) Define equilibrium cant.

3) What are the disadvantages of highly canted curved track?

4) What is the problem with points and crossing in contrary flexure?

5) What are the advantages and disadvantages of straight tongue rails?

6) What is the advantage of overriding switch?

7) Brief draw splice rail, point rail and ANC.

8) What is the advantage of Y-shaped sleeper track?

9) Define transition curve.

10) What is high-speed turnout?

Long Answers: **[30 Marks]**

1) Calculate all the necessary elements (curve lead, switch lead, crossing lead) required to set out a 1 in 16 turnouts, taking off from a straight B.G, track with its curve starting from the toe of the switch, i.e. tangential to the gauge face of the outer mail rail and passes through TNC. Heel divergence can be taken as 11.0 cm. Cole's method is used to designate the number of crossings.

$Curve\ Lead\ (CL) = 2GN$

$Ro = 2GN^2 + 1.5G$

$Switch\ Lead = \sqrt{2Rod}$

2) A super-fast express passenger train is to run on a BG track from Mumbai (starting station) to Ahmedabad (end station) for a stretch of 550 kms and there are 5 stops (at an equal interval) apart from the starting and end stations. The dwelling time at each of the stations is approximately 10 minutes. Out of 550 kms, 10 kms are on curves with radius of curve equal to 250 m between the stretch 500 kms and 550 kms. The total travel time (start time to end time) should not exceed 5 hours. It is also to be noted that there are five loops located at an interval of 100 kms primarily meant for overtaking purposes. It is also to be noted that except for the loops, there are no other tracks. The goods train has started on the same track from Mumbai with the sanctioned speed of 30 kmph exactly one hour prior to this train's departure. There is no stop as far as goods train is concerned.

Make suitable assumptions and Assess the following.

a. Maximum possible speed of the train that can be allowed on straight portion and on curves
b. After how much time and distance does the express train take to catch up with goods train and overtake?