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B. Sc. Engg. (CEE)/ 6th Sem. 06 March 2024 (Group B: Afternoon)

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

Mid-Semester Examination **Summer Semester: 2022-2023**

Course No.: CEE 4653 **Full Marks: 75**

Course Title: Pavement & Railway Engineering **Time: 1.5 Hours**

There are 4 (Four) questions. Answer any 3 (Three) questions. Programmable calculators are not allowed. Do not write on question paper. Figures in the right margin indicate full marks. Symbols have their usual meanings. Assume reasonable values for any missing data.

1(a) Discuss qualities of railway sleepers and outline its function. Explain issues caused by change of Gauge. (5+5) (CO1-PO1)

1(b) Differentiate between the following: (15) (CO2-PO2)

(i) Through sleeper and Interlaced sleepers
(ii) Flag Stations and block stations.
(iii) Station and yard.
(iv) Points and Crossings.
(v) Repeating signals and Co-acting signals.

2(a) Describe the defects of the rail and reasons behind each type of rail issue. Discuss with sketch why only one side of the rail is get damaged when placed on a curve. (10) (CO1-PO1)

2(b) What are the conditions to be satisfied in case of interlocking for a single line station with a loop and a siding? Explain with figure. Why are marshalling yards necessary? Describe along with the layout of a typical marshalling yard. (6+3+6) (CO2-PO2)

3(a) Calculate the maximum permissible load that a BG locomotive with three pairs of driving wheels bearing an axle load of 22t each can pull on a straight level track at a speed of 80 km/h. What would be the further reduction in speed if the train has to negotiate a 4° curve on the rising gradient? Assume the coefficient of friction to be 0.2. (10) (CO1-PO1)

3(b) Define super-elevation. Also discuss the factors affecting super-elevation. What is meant by deficiency in super-elevation? Explain with figure. Define equilibrium cant. Write down the two limitations of cant deficiency. (5+6+4) (CO2-PO2)

4(a) Why coning of wheel is provided? Explain with sketch. Find required ballast depth if the sleeper density is M+5 on broad gauge track is M= 14 meter. (6+4) (CO1-PO1)

4(b) A 6 degrees curve branches off from a main curve in an opposite direction in the layout of a B.G. yard. The speed restriction on the main line and branch line are 60 km/hr and 35 km/hr respectively? Find the radius of the curve of the main line. Assume permissible cant deficiency as 75 mm. (7+8) (CO2-PO2)

Draw a sketch showing positions of various signals for a junction of two main lines and two branch lines with a siding.