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MANIPAL INSTITUTE OF TECHNOLOGY

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VII SEMESTER B.TECH. (CIVIL) END SEMESTER EXAMINATIONS, NOV/DEC 2018

SUBJECT: RAILWAY & AIRPORT ENGINEERING [CIE 4102]

Date of Exam: Time of Exam: 2:00 pm - 5:00 pm Max. Marks: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

Q. No		Marks	CO
1A.	Describe the following terminologies used in railways: a) Track Modulus b) Audible signal c) Adzing of sleepers d) Chairs	**2**	**1**
1B.	Compute the steepest gradient that a train of 20 wagons and a locomotive can negotiate given the following data: weight of each wagon = 20 t, weight of locomotive = 150 t, tractive effort of locomotive = 15 t, rolling resistance of locomotive = 3 kg/t, rolling resistance of wagon = 2.5 kg/t, speed of the train = 60 km/h.	**5**	**2**
1C.	Derive an equation for a tractive effort by a steam locomotive and discuss the assumptions that can be drawn out from the equation.	**3**	**2**
2A.	Describe the term creep indicator. List out the requirements of a good sleeper used in a railway track.	**4**	**1**
2B.	Explain the concept of negative super elevation on track with a neat sketch.	**3**	**1**
2C.	Calculate the maximum permissible speed on a 1^0 curve on a Rajdhani route with a maximum sanctioned speed of 130 km/h. The super elevation provided is 50 mm and the transition length is 60m. The transition length of the curve cannot be increased because of the proximity of the yard.	**3**	**3**
3A.	Illustrate a left hand turnout with a neat sketch.	**3**	**2**
3B.	Explain with a neat sketch the automatic block system.	**4**	**4**
3C.	Distinguish between co-acting signal and routing signal.	**3**	**4**
4A.	Define the following terms: (i) Gate position (ii) Mach Number iii) Wind rose diagram	**3**	**1**

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Q. No		Marks	CO
4B	Explain with a neat sketch the lift and drag forces acting on an aircraft.	**4**	**1**
4C	A taxiway is to be designed for operating a subsonic aircraft on a class B airport which has the following characteristics: Wheel base 28.7m Tread of main gear loading gear 6.62m Turning speed 12.5 m/s Coefficient of friction between tire and pavement surface 0.13. Determine the turning radius of taxiway.	**3**	**4**
5A	An airport is proposed at an elevation of 400 m above Mean Sea Level where the mean of maximum and mean of average daily temperature of the hottest month are 44.8^0 C and 26.2^0 C respectively. Length of the runway under standard conditions is 2.5 km. Gradient to be provided at site is as follows: Range in metres / Gradient in % 0 – 500 / -0.5 500 -1000 / +0.5 1000 -1500 / -1 1500 - 2000 / +0.5 2000 - 2500 / +0.3 Determine the actual length of runway at the site.	**4**	**4**
5B.	Explain with a neat sketch the various aircraft parking systems.	**4**	**5**
5C.	Describe the various components of an Instrument Landing System.	**2**	**5**