BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP2023)

CLASS: BTECH **SEMESTER : VI**
BRANCH: EEE **SESSION : SP/2023**

SUBJECT: EE443 UTILIZATION OF ELECTRICAL POWER

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions. Answers should be to the point
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	What is Traction system? Elaborate the requirement of Ideal Traction system (Good Traction system).	[2]	1	2
Q.1(b)	Average speed of a train is 50 kmph. Determine its maximum speed, assuming trapezoidal speed time curve, distance between stops is 2.5 km, acceleration is 1.8 kmphps and retardation is 3 kmphps.	[3]	1	3
Q.2(a)	Draw Speed-Time, Torque-Time, Power-Time curve for main line traction service between two stations to mark its Duty Cycle.	[2]	1	2
Q.2(b)	An Electric Train weighing 400 tonnes (excluding locomotive) moves up a gradient of 1% with an acceleration of 0.8 kmphps, coefficient of adhesion is 0.25, train resistance is 50 newton per tonne. Find the adhesive weight of Locomotive(engine),allow 10% for rotational inertia.	[3]	1	3
Q.3(a)	Establish relationship between tractive force produced and torque exerted by motors. Gear Ratio, gear efficiency, diameter of the wheel will be other constants.	[2]	1	3
Q.3(b)	A 250 tonne motor coach with 4 motors takes 20 sec to reach max speed of 60 kmph when moving up a gradient of 1%. Gear ratio is 3, gear efficiency is 90%, wheel dia is 91.5 cm, train resistance is 50 N/tonne, allow rotational inertia 10% of dead weight. Determine torque produced by each motor.	[3]	1	3
Q.4(a)	With a neat diagram, Explain how a chopper controlled DC traction system will accelerate, move as free run and undergo braking(composite).	[2]	1	2
Q.4(b)	(i) Why Suburban/City Traction service uses more abd more motor coaches rather than passenger coaches? (ii) How Coefficient of Adhesion (μ) depends on speed time characteristic of motor? (iii) Which connection of motors-series or parallel is suitable so fas as negotiating a slippery portion of track is concerned and Why?	[3]	1	2
Q.5(a)	In 25 KV, Semiconductor Converter fed(AC-DC) AC traction system ,Why Power factor is poor at starting, What is ill effect of low p.f, How can be corrected ??	[2]	1	3
Q.5(b)	With a neat circuit diagram, explain the working of 25KV AC ,2 stage Converter (AC-DC) fed traction system. How does it tackles ill effect of low pf and harmonics ??	[3]	1	2

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