

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B.TECH
BRANCH: EEE

SEMESTER : VII
SESSION : MO/2023

SUBJECT: EE629 HYBRID ELECTRIC VEHICLE

TIME: 3 HOURS

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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		CO	BL
Q.1(a)	List impact of Nitrogen Oxides (NO _x) produced due to the combustion of Hydrocarbons.	[5]	1 1
Q.1(b)	Show power flow in Series-configurations of Hybrid Electric Vehicles (HEV) with the help of a block diagram in all modes of operation.	[5]	1 1
Q.2(a)	Compare between formation of rolling resistance on (i) a hard and (ii) a soft surface with the help of a suitable diagram.	[5]	2 2
Q.2(b)	Explain the power plant performance characteristics of gasoline engines in terms of power, torque, and speed.	[5]	2 2
Q.3(a)	Apply the working principle of a four stroke (4S) engine in order to draw pressure vs volume curve during one complete cycle of engine.	[5]	3 3
Q.3(b)	Obtain the relation between mechanical efficiency of engine at crank-shaft in terms of brake power and friction power	[5]	3 3
Q.4(a)	Analyze a generalized block diagram of an HEV consisting of control units as well as drive train in order to show power flow.	[5]	4 4
Q.4(b)	Analyze the vehicle performance characteristics in terms of tractive effort and vehicle speed and show the zone of maximum speed achievable.	[5]	4 4
Q.5(a)	Design a torque coupling mechanism for parallel hybrid electric drive train	[5]	5 5,6
Q.5(b)	Design a speed coupling mechanism for parallel hybrid electric drive train	[5]	5 5,6

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