

MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

A Constituent Institution of Manipal University

## VII SEMESTER B.TECH. (AUTOMOBILE ENGINEERING) END SEMESTER EXAMINATIONS, DEC/JAN 2017-2018 SUBJECT: ELECTRIC & HYBRID VEHICLES [AAE 4021] REVISED CREDIT SYSTEM

(30/12/2017)

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Т	Time: 3 Hours MAX. MARKS: 54	
	Instructions to Candidates:	
	<ul> <li>Answer ALL questions.</li> <li>Sketch using only pencil.</li> </ul>	
1A.	Define rolling resistance and explain different conditions for the pressure distribution on the tyres about the road surface.	(05)
1B.	Sketch and explain the working of Zn-Air battery.	(02)
1C.	Explain the procedure for modeling the battery for its capacity.	(03)
2A.	Discuss the power flow layouts for series hybrid architecture.	(05)
2B.	List and explain the design of power control strategies for HEVs.	(03)
2C.	Explain the concept of fixed gearing.	(02)
3A.	Write the charge and discharge equations for NiMH battery.	(02)
3B.	Obtain the dynamic equation for the tractive effort for the front and rear wheels of the vehicle.	(03)
3C.	Discuss the working of Buck-Boost DC/DC converters.	(05)
4A.	Sketch and explain the basic working with reaction for proton exchange membrane fuel cell.	(05)
4B.	Sketch and explain the torque speed characteristic curve for electric motor.	(03)
4C.	Discuss the method of storing hydrogen using cryogenic cylinders.	(02)
5A.	Sketch and explain the principle of operation of Permanent magnet electric machines.	(05)
5B.	Compare fast charging to trickle charging.	(03)
5C.	Write a note on CAN transfer protocol.	(02)