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

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

SUBJECT: ME305 AUTOMOBILE ENGINEERING

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.

			CO	BL
Q.1(a)	Explain the construction and working of battery or coil ignition system with neat sketch.	[5]	CO1	BL1
Q.1(b)	Briefly explain the various sensors that can be used for displacement and position sensing in an engine.	[5]	CO1	BL2
Q.2(a)	Derive the expression for tractive effort and gradeability.	[5]	CO2	BL6
Q.2(b)	A truck has a following data: Gross vehicle weight - 89026 N Engine power at governed speed of 2400 rpm is 77.3 kW Maximum torque is 345.8 Nm at 1400 rpm Rear axle ratio is 6.166:1 Fourth speed reduction ratio in transmission is 1.605 :1 Drive line losses amount to 10.7 kW at 2400 rpm and 6.3 kW at 1400 rpm Effective wheel diameter - 0.950 m Frontal area of truck - 6.95 m^2 Total resistance, R (in Newton) = $0.014W + 0.0462AV^2$ (Where A is truck's frontal area in m^2, W is its weight, V is the speed in km/hr). Overall gear ratio G = 9.9:1 Calculate the grades which the vehicle can climb in fourth gear in still air conditions at (i) governed engine speed (ii) speed of maximum torque	[5]	CO2	BL5
Q.3(a)	Define clutch and its working principle. Also, discuss its role in transmission system.	[5]	CO3	BL1
Q.3(b)	Illustrate the working of a sliding gearbox. List out the advantages of constant mesh gearbox over sliding mesh gearbox.	[5]	CO3	BL4
Q.4(a)	Briefly discuss the significance of castor angle, camber angle and toe-in & toe-out in wheel alignment.	[5]	CO4	BL2
Q.4(b)	How does a hydraulic power steering work? Explain.	[5]	CO4	BL2
Q.5(a)	Distinguish between parallel and series-parallel combinations of hybrid vehicles.	[5]	CO5	BL4
Q.5(b)	Sketch and discuss the working method of a fuel cell.	[5]	CO5	BL3

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