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

CLASS: MTECH **SEMESTER : II**
BRANCH: SER **SESSION : SP/2023**

SUBJECT: SR521 COMPUTATIONAL COMBUSTION

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)	Write the most general form of continuity equation and reduce it to a divergence condition.	[5]	1	3
Q.1(b)	Write the most general form of energy transport equation and reduce it to a form suitable for solving heat transfer through a sphere.	[5]	1	3
Q.2(a)	Identify boundary conditions for the expansion of a laminar jet into stagnant ambient environment.	[5]	2	3
Q.2(b)	Identify the initial conditions required to start the solution of a laminar jet of fuel injected into an oxygen-rich environment at stagnant conditions.	[5]	2	3
Q.3(a)	Obtain a Favre averaged form of continuity equation.	[5]	4	2
Q.3(b)	Briefly describe the eddy breakup model for accounting turbulence-chemistry interactions.	[5]	4	2
Q.4(a)	Explain the set of equations used for tracking the motion of droplets in cold ambient conditions.	[5]	1,4	4
Q.4(b)	How could you include the effects of heat and mass exchange in the tracking method for droplets?	[5]	1,4	4
Q.5(a)	Explain the $M \rightarrow 0$ approximation.	[5]	1,4	4
Q.5(b)	Write a form of energy transport equation suitable for compressible flows and explain each term in brief.	[5]	1,4	4

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