BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2025)

CLASS: BTECH **SEMESTER : VI**
BRANCH: MECHANICAL **SESSION : SP/2025**

SUBJECT: ME361 COMBUSTION

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.
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 enthalpy of formation and enthalpy of combustion?	[2]	1	L2
Q.1(b)	A gas turbine engine operates at an equivalence ratio of 0.286 with an air flow rate of 15.9Kg/s. The equivalent composition of the fuel (natural gas) is C1.16H4.32. Determine the fuel mass flow rate and the operating air-fuel ratio for the engine. MWair=28.85gms.	[3]	1	L4
Q.2(a)	What are the various methods used for determination of adiabatic flame temperature?	[2]	1	L2
Q.2(b)	What are the reasons for variation in measured adiabatic flame temperature and that computed theoretically? Draw a process diagram for the calculation of adiabatic flame temperature and its estimation using the diagram.	[3]	1	L3
Q.3(a)	What do you understand by a chain reaction? Explain the reaction mechanism with the help of an example.	[2]	2	L2
Q.3(b)	Demonstrate the various equilibrium criteria and their conditions at equilibrium condition.	[3]	1	L4
Q.4(a)	Describe the conditions under which a fuel oxidant mixture is inflammable?	[2]	2	L2
Q.4(b)	Calculate the limits of inflammability of a gas mixture containing 40% methane, 20% butane and 40% hydrogen. Limits of inflammability for methane (5.3 and 14), butane (1.9 & 8.5) and hydrogen (4.0 & 75).	[3]	2	L3
Q.5(a)	What is Order of a reaction and Molecularity of a reaction? Hoes does they differ?	[2]	2	L2
Q.5(b)	What is a first order reaction? Explain with the help of an example. Derive the equation for rate constant and half-life of a first order reaction.	[3]	2	L3

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