

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

**CLASS: BTECH
BRANCH: ALL**

**SEMESTER : VII
SESSION : MO/2025**

SUBJECT: SR511 FUNDAMENTALS OF FUELS AND 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

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|--|-----|----|----|
| Q.1(a) What is working principal for an OTEC power plant? What are the challenges associated? | [2] | 1 | L2 |
| Q.1(b) Describe how tidal energy can be harnessed for power generation. Use diagrams. | [3] | 1 | L2 |
| Q.2(a) What are the components in a nuclear reactor? Describe with the help of a diagram. | [2] | 1 | L2 |
| Q.2(b) Illustrate the different geothermal power plants used for harnessing energy? What are the pros and cons of using geothermal energy? | [3] | 1 | L3 |
| Q.3(a) Discuss various ways of utilization of solar energy? | [2] | 1 | L2 |
| Q.3(b) What are the different types of sulphur in coal? How is sulphur in coal determined? | [3] | 1 | L2 |
| Q.4(a) What is Proximate analysis? How are moisture, volatile matter, ash and fixed carbon determined in a coal sample? | [2] | 1 | L2 |
| Q.4(b) Describe how the different stages of coke formation leads to the different types of coke. | [3] | 2 | L2 |
| Q.5(a) The following data are available for Chanch coal of the Raniganj coalfield, | [5] | 2 | L3 |

Proximate Analysis, percent air-dried				Ultimate Analysis, percent dmmf				Calorific value Kcal/kg
Moisture	Ash	VM	FC	C	H	S	N	
2.3	14	29.1	54.6	84.5	6.27	0.64	3.37	6890

- (a) Calculate calorific value using CFRI and Dulong's formula and compare the computed value with the experimental.
- (b) Calculate the volatile matter, and fixed carbon on dmmf basis.

:::23/09/2025 :::M