

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

CLASS: BTECH
BRANCH: BT/CIVIL/CP&P/PROD/CSE/EEE/ECE/IT

SEMESTER: 6th
SESSION : SP/2023

SUBJECT: ME391 ELEMENTS OF NUCLEAR AND DIESEL POWER PLANTS
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.
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| Q.1(a) | Justify application of nuclear energy in power sector in the present day context. Briefly discuss its impact on the environment. | [5] 1 | 3 |
| Q.1(b) | Fertilizers are extensively in use for increasing the productivity of crops. They are also expensive if not properly used, can damage the environment as well. Briefly discuss how radioactive isotopes will be helpful in the management of fertiliser use. | [5] 1 | 2 |
| Q.2(a) | Briefly discuss the important characteristics of a breeder reactor. List some nuclear materials which are used as fuels in breeder reactors. | [5] 2 | 2 |
| Q.2(b) | During a 10 hour run, a railway engine develops an average power of 1200 KW. If the engine is required to run on nuclear fuel U^{235} with an efficiency of 25%, how much quantity of U^{235} fuel would be required assuming that each atom of U^{235} upon fission releases 180 MeV of energy. | [5] 5 | 4 |
| Q.3(a) | State the conclusions that were drawn during the conduct of Fermi Pile experiment. | [5] 3 | 2 |
| Q.3(b) | Mention the important objectives of any nuclear protection system. List the names of few important subsystem of a nuclear protection system along with their functions that comprise a complete and reliable reactor protection system. | [5] 3 | 2 |
| Q.4(a) | What are different types of diesel engines for diesel power plants? Briefly discuss few important systems of diesel power plants. | [5] 4 | 2 |
| Q.4(b) | Explain the purpose of supercharging of diesel engines. Mention few merits and demerits of supercharging. | [5] 4 | 2 |
| Q.5(a) | Compare the performance of supercharged diesel engines with naturally aspirated diesel engines on the basis of performance curve. | [5] 5 | 4 |
| Q.5(b) | Discuss the advantages and disadvantages of diesel power plants over nuclear and thermal power plants. | [5] 5 | 3 |

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