

Hall Ticket Number:

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Code No. : 18521 B

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD*Accredited by NAAC with A++ Grade***B.E. (Mech. Engg.) VIII-Semester Main & Backlog Examinations, June-2022****Power Plant Engineering (PE-V)**

Time: 3 hours

Max. Marks: 60

*Note: Answer all questions from Part-A and any FIVE from Part-B**Part-A (10 × 2 = 20 Marks)*

| Q. No. | Stem of the question | M | L | CO | PO |
|----------------------------------|--|---|---|----|---------------------|
| 1. | Define weatherability of coal and list any two effects of weathering of coal. | 2 | 1 | 1 | 1,6,7,8,10,12 |
| 2. | Distinguish between higher ranking and lower ranking of coal and write the meaning of (62-5000) rank coal. | 2 | 1 | 1 | 1,6,7,8,10,12 |
| 3. | List any four basic requirements of combustion equipment for complete combustion. | 2 | 1 | 2 | 1,6,7,8,10,12 |
| 4. | Define stoker and differentiate between over feed stokers & under feed stokers. | 2 | 1 | 2 | 1,6,7,8,10,12 |
| 5. | Write the six site selection criteria for hydroelectric power plant. | 2 | 1 | 3 | 1,2,3,4,6,7,8,10,12 |
| 6. | Define run-off and write its balance equation with evaporation and precipitation. | 2 | 1 | 3 | 1,2,3,4,6,7,8,10,12 |
| 7. | List any four differences between fission and fusion reactions. | 2 | 1 | 4 | 1,6,7,8,10,12 |
| 8. | Define conversion ratio/breeding ratio and differentiate between conversion and breeding based on it. | 2 | 1 | 4 | 1,6,7,8,10,12 |
| 9. | If cost of the asset is 'A', salvage value is 'S' and useful life of the asset is 'U' then write the expression for Annual depreciation expense. | 2 | 1 | 5 | 1,2,3,4,6,7,8,10,12 |
| 10. | Differentiate between the plant capacity factor and plant use factor. | 2 | 1 | 5 | 1,2,3,4,6,7,8,10,12 |
| Part-B (5 × 8 = 40 Marks) | | | | | |
| 11. a) | Explain the coal & ash circuit and air & flue gas circuit of a steam power plant with the help of neat diagrams. | 5 | 2 | 1 | 1,6,7,8,10,12 |
| b) | Differentiate between the proximate and ultimate analysis of coal. | 3 | 2 | 1 | 1,6,7,8,10,12 |
| 12. a) | Describe the principle, working, advantages and limitations of travelling stoker with the help of neat diagram. | 5 | 2 | 2 | 1,6,7,8,10,12 |
| b) | List the five zones of over feed stoker with the help of neat diagram. | 3 | 2 | 2 | 1,6,7,8,10,12 |
| 13. a) | Name all the components on the flow sheet of a hydroelectric power plant with the help of a neat diagram and explain the difference between storage and pondage. | 3 | 3 | 3 | 1,2,3,4,6,7,8,10,12 |

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| b) | The runoff data of a river at a particular site in 12 months from January to December is given by 40, 25, 20, 10, 0, 50, 75, 100, 110, 60, 50, 40 respectively in millions of cubic meters. (i) Draw the hydrograph and find the mean flow (ii) Draw the flow duration curve (iii) Find the power in MW available at mean flow if the head available is 80m and overall efficiency of the generation is 85%. Consider each month of 30 days. | 5 | 3 | 3 | 1,2,3,4,6,7,8,10,12 |
| 14. a) | With the help of a neat diagram explain the principle, working, advantages and disadvantages of Pressurized Water Reactor (PWR). | 5 | 2 | 4 | 1,6,7,8,10,12 |
| b) | List the three main sources of radioactive contamination of air at nuclear power plants and write the desirable properties of a good shielding material. | 3 | 2 | 4 | 1,6,7,8,10,12 |
| 15. a) | List the five major pollutants of air and explain their effects on human beings, vegetation, materials and animals. | 3 | 3 | 5 | 1,2,3,4,6,7,8,10,12 |
| b) | A power plant has a maximum demand of 5000 MW and the daily load on the power plant is given as below: 11PM to 6AM = 1000 MW; 6AM to 8 AM = 1750 MW; 8AM to 12PM = 4000 MW; 12PM to 1PM = 1500 MW; 1PM to 5PM = 3750 MW; 5PM to 7PM = 4250 MW; 7PM to 9PM = 5000 MW; 9PM to 11PM = 2250 MW. (i) Draw the load curve; (ii) Draw the load duration curve; (iii) Select the size and number of generator units along with reserve plant (iv) Find load factor and plant capacity factor. | 5 | 3 | 5 | 1,2,3,4,6,7,8,10,12 |
| 16. a) | Describe the principle, working, advantages and disadvantages of belt conveyer and screw conveyers with the help of neat diagrams. | 4 | 2 | 1 | 1,6,7,8,10,12 |
| b) | Define pulverization of coal and differentiate between the unit and central systems of coal pulverization with the help of neat diagrams. | 4 | 2 | 2 | 1,6,7,8,10,12 |
| 17. | Answer any <i>two</i> of the following: | | | | |
| a) | List the advantages of non-conventional energy sources and explain the principle, advantages and disadvantages of any two non-conventional power plants. | 4 | 2 | 3 | 1,2,3,4,6,7,8,10,12 |
| b) | Illustrate the essential components of a nuclear reactor with the help of a neat diagram and explain. | 4 | 3 | 4 | 1,6,7,8,10,12 |
| c) | Illustrate the removal of Sulphur dioxide using wet scrubber method with the help of neat diagram. | 4 | 3 | 5 | 1,2,3,4,6,7,8,10,12 |

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

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| i) | Blooms Taxonomy Level - 1 | 25% |
| ii) | Blooms Taxonomy Level - 2 | 45% |
| iii) | Blooms Taxonomy Level - 3 & 4 | 30% |

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