

JK LAKSHMIPAT UNIVERSITY, JAIPUR
INSTITUTE OF ENGINEERING AND TECHNOLOGY
EndTerm Examination (Regular/Backlog), April-May2018
B. Tech. 2nd Year, Semester-IV

Roll No.....

EE 403- Energy Sources

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

- Q.1A Objective type multiple choice questions (10 questions @ 1 mark) 10
- i. Why is a big consumer charged at a lower rate than the small consumer: (a) Their maximum demand is small. (b) It improves the load factor. (c) Both a and b (d) None of these.
 - ii. Flat rate tariff is charged on what basis?
(a) Connected load. (b) Units consumed. (c) Maximum demand. (d) Both a and b
 - iii. Power plants using coal work closely on known which of the following cycle: (a) Otto cycle
(b) Binary vapor cycle (c) Brayton cycle (d) Rankine cycle.
 - iv. In a hydro-electric plant a conduct system for taking water from the intake works to the turbine is known as: (a) Dam (b) Reservoir (c) Penstock (d) Surge tank.
 - v. If the diversity factor of a power station is high then its generation cost is
(a) high (b) low (c) remain same (d) depend on the plan type.
 - vi. What does the highest points on the daily load curve represents?
(a) average load (b) based load (c) maximum demand (d) load factor.
 - vii. A module is a: (a) newly installed solar cell (b) series parallel arrangement of solar cells
(c) a series of solar cells when not used for power generation (d) none of the above.
 - viii. The total power of a wind stream is proportional to: (a) velocity of stream
(b) (velocity of stream)² (c) (velocity of stream)³ (d) 1/ (velocity of stream)
 - ix. In geothermal power plants waste water is: (a) re circulated after cooling in cooling towers
(b) discharged into sea (c) discharged back to earth (d) evaporated in ponds.
 - x. In a fuel cell, electrical energy is produced by: (a) Reaction of hydrogen with oxygen
(b) Thermionic action (c) Combustion of fuel in the absence of oxygen (d) None of the above.
- Q.2 Short answer type questions (4 questions @ 2.5 marks) 10
- i. What is meant by base load?
 - ii. What are bio-mass energy resources and what is energy yield from each of them?
 - iii. What is meant by pitch control?
 - iv. What is the average range of solar radiation received on the earth's surface during day?
- Q.3A A consumer needs one million units per year and his annual load factor is 50%. The tariff in force is Rs. 1200 per kW plus Rs. 2.40 per unit. Estimate the saving in his energy cost, which would result if he improves his load factor to 100 percent. 05
- Q.3B What percentage of solar energy reaching the upper atmosphere of earth reaches the lower atmosphere? What happens to the rest? 05
- Q.4A What factors determine the choice of site of a thermal power plant? 05
- Q.4B What is magneto-hydro-dynamic generation? Explain basic principle of operation of such a generator. 05

- Q.5A The load on the power plant on a typical day is as under: 05
- | | | | | | |
|------------|---------|--------|--------|---------|----------------|
| Time: | 12-5 am | 5-9 am | 9-6 pm | 6-10 pm | 10-12 midnight |
| Load (MW): | 20 | 40 | 80 | 100 | 20 |
- Plot the chronological load curve and load duration curve. Find the load factor of the plant and the energy supplied by the plant.
- Q.5B What range of wind speed is considered favorable for wind power generation? What factors led to the accelerated development of wind power? 05
- Q.6A The cost of a small preheater is Rs. 12,000/- and its expected life is 16 years. The net annual installment to recover the cost of equipment is Rs. 425/-. The interest is 5%. Using sinking fund method find out the salvage value of the preheater after 16 years of services. 05
- Q.6B Discuss the factors affecting economics of generation and distribution of power and how to reduce the power generation cost. 05
- OR
- Q.6B Explain the function of moderator and control rods in nuclear reactor. How is a moderator selected? 05
- Q.7A What are the different systems of tariff used by the electricity authority? Discuss any two them and indicate the types of consumers where such tariffs are used. 05
- Q.7B What is solar cell? How does the collection of solar energy affected by tilting a flat plate collector with respect to ground? 05
- OR
- Q.7B What is Geo-thermal energy? How is electricity generated from Geo-thermal energy? 05
- Q.8A Determine the generation cost per unit of energy from the following plant data: 10
- Installed capacity = 120 MW, capital cost of the plant = Rs. 40000 per kW, interest and depreciation = 15%, fuel consumption = 0.64 kg/kWh, fuel cost = Rs.1500 per 1000 kg, salaries-wages-repairs and other operating costs per annum = Rs. 50,000,000/-, peak load = 100 MW, load factor = 60%.
- Q.9A From a load duration curve, the following datas are available. The maximum demand on the system is 25 MW. The load supplied by two units is 15 MW and of 12.5 MW Unit-1 acts as base load unit and unit-2 as peak load unit. The base load unit works for 100% of the time and peak load unit for only 40% of the time. The energy generated by unit-1 is 1×10^8 units and that by unit-2 is 1×10^7 units. Determine the load factor, plant capacity factor and plant use factor of each unit and load factor of the total plant. 10
- Q.9B What is the source of tidal energy? Which is the minimum tidal range required for a practical tidal plant? How much is the potential in tides? 10
- OR
- Q.9B What is the basic principle of ocean thermal energy conversion (OTEC)? Describe the 'closed cycle' OTEC system, with its advantages over 'open cycle' system. 10