

B.TECH.
(SEM IV) THEORY EXAMINATION 2022-23
ENERGY SCIENCE AND ENGINEERING

Time: 3 Hours

Total Marks: 100

Note: 1 Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief. 2 x 10 = 20

- (a) Give the examples of Potential Energy.
- (b) What is energy quantization?
- (c) If you turn on 4 light bulbs, each rated at 40 w, how long can they be on before you reach 1kwh?
- (d) What are the two types of charge carriers in semiconductors?
- (e) How is energy generated from bio energy?
- (f) What is the anticipated life of a wind farm?
- (g) Why is ocean thermal energy conversion a renewable resource?
- (h) Write the characteristics of a green building.
- (i) What is the criteria for LEED rating ?
- (j) How do you calculate the embodied energy of material?

SECTION B

2. Attempt any three of the following: 10x3=30

- (a) Derive time independent Schrodinger wave equation.
- (b) Calculate the binding energy per nucleon of ${}_{17}\text{Cl}^{35}$ nucleus. Given Mass of ${}_{17}\text{Cl}^{35}$ is 34.9800U; Mass of Proton (${}_{1}\text{p}_1$) is 1.008665U and Mass of neutron (${}_{0}\text{n}^1$) is 1.007825U
- (c) Show that radioactive decay follows exponential law.
- (d) What are the devices used for measuring the solar radiations? Explain with any one of them with neat sketch.
- (e) With neat sketch explain the concept of green building .Also write the factors which can made a building green?

SECTION C

3. Attempt any one part of the following: 10x1=10

- (a) Explain the Carnot vapour power cycle with T-s diagram. Also find out the efficiency of Carnot cycle.
- (b) Explain Brayton cycle and obtained expression for efficiency in terms of pressure and temperature ration.

4. Attempt any one part of the following: 10x1=10

- (a) What do you mean by binding energy? What is the total binding energy per nucleon for the ${}_{6}\text{C}^{12}$ nucleus?
- (b) With a neat sketch, explain pressurized water reactor (PWR) highlights its merits and demerits.

5. Attempt any *one* part of the following: 10x1=10

- (a) Discuss p-n junction in forward bias and reversed bias condition.
- (b) Derive V-I and P-V characteristics of photo volatile device.

6. Attempt any *one* part of the following: 10x1=10

- (a) Derive the continuity equation for 1-D fluid flow. Also derive the expression for wind power.
- (b) Write down the principle of power generation in wind mills. Derive an expression for maximum efficiency.

7. Attempt any *one* part of the following: 10x1=10

- (a) Describe steps for methodology for energy audit. List the key instrument for energy audit.
- (b) What is a nuclear fuel cycles? What steps are involved in Nuclear fuel cycle?

QP23EP2_290

| 03-08-2023 13:26:12 | 117.55.242.132