PAPER ID-310902

Roll No: | | | | | | | | | | | | | |

B TECH
(SEM-III) THEORY EXAMINATION 2020-21
ENERGY SCIENCE & 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**

Qno.	Question	Marks	CO
a.	What are three examples of units used for energy?	2	3
b.	What is a heat energy example?	2	3
c.	What is so bad about nuclear energy?	2	2
d.	What are the 4 fundamental forces in the universe?	2	3
e.	What are 5 advantages of solar energy?	2	3
f.	What is meant by carrier transport in semiconductor?	2	3
g.	What are 3 conventional sources of energy?	2	2
h.	Why is fluid dynamics so hard?	2	2
i.	How long does it take for nuclear radiation to kill you?	2	3
j.	What is the cause of climate change?	2	3

SECTION B

2. Attempt any *three* of the following:

Qno.	Question	Marks	CO
a.	Two engines are to operate on Otto and Diesel cycles with the following data: Maximum temperature 1400 K, exhaust temperature 700 K. State of air at the beginning of compression 0.1 MPa, 300 K. Estimate the compression ratios, the maximum pressures, efficiencies, and rate of work outputs (for 1 kg/min of air) of the respective cycles.	10	4
b.	What is the importance of quantum mechanics? What are some useful applications of nuclear physics? Explain briefly.	10	3
c.	What are the two basic ways to measure solar radiation? Explain with neat sketches.	10	4
d.	The shear stress developed in lubricating oil, of viscosity 9.81poise, filled between two parallel plates 1 cm apart and moving with relative velocity of 2 m/s is?	10	4
e.	What happens to waste of a nuclear plant system? What are the 3 levels of nuclear waste? Explain with neat sketches.	10	3

SECTION C

3. Attempt any *one* part of the following:

a.	An engine equipped with a cylinder having a bore of 15 cm and a stroke of 45 cm operates on an Otto cycle. If the clearance volume is 2000 cm^3, compute the air standard efficiency.	10	4
b.	Two kg of water at 80°C are mixed adiabatically with 3 kg of water at 30°C in a constant pressure process of 1 atmosphere. Find the increase in the entropy of the total mass of water due to the mixing process (cp of water = 4.187 kJ/kg K).	10	4

4. Attempt any *one* part of the following:

a.	What do you mean by nuclear forces? What are the types of nuclear forces? Explain briefly.	10	2
b.	What is the safest nuclear reactor design? What are the four main components of a fission reactor? Explain briefly.	10	2

5. Attempt any *one* part of the following:

a.	What is difference between metal semiconductor junction and pn junction? Explain briefly.	10	3
b.	What is the principle of solar photovoltaic power generation? Explain briefly with neat sketches.	10	4

6. Attempt any *one* part of the following:

a.	How are wind turbines designed? Explain briefly with neat sketches.	10	3
b.	How does geothermal power work? Explain briefly with neat sketches. What are the advantages and disadvantages of geothermal energy?	10	3

7. Attempt any *one* part of the following:

a.	What is the concept of green building? What are the 7 components of green building?	10	3
b.	What is energy audit? How many types of energy audits are there? Explain briefly.	10	3