Paper id: 251012

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

BTECH
(SEM VI) THEORY EXAMINATION 2024-25
ENERGY HARVESTING TECHNOLOGIES AND POWER MANAGEMENT FOR IOT DEVICES

TIME: 3 HRS **M.MARKS: 70**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt *all* questions in brief. **02 x 7 = 14**

Q no.	Question	CO	Level
a.	Define energy harvesting and list any two energy sources.	CO1	K1
b.	What is a photovoltaic cell? Mention any one type.	CO1	K1
c.	List any two piezoelectric materials commonly used in energy harvesting.	CO2	K1
d.	What is meant by a lumped parameter model?	CO2	K2
e.	Briefly state the principle of electromagnetic energy harvesting.	CO3	K1
f.	What are power conditioning losses in energy harvesting circuits?	CO4	K2
g.	Name two applications of RF energy harvesting.	CO5	K1

SECTION B

2. Attempt any *three* of the following: **07 x 3 = 21**

a.	Explain the working principle of electric power generation in semiconductor photovoltaic cells.	CO1	K2
b.	Describe the structure and working of piezoelectric transducers with examples.	CO2	K2
c.	Discuss microfabricated coils and their significance in electromagnetic energy harvesting.	CO3	K2
d.	What are the different sources of power for Wireless Sensor Networks?	CO4	K2
e.	Write a short note on Bio-MEMS-based energy harvesting systems.	CO5	K2

SECTION C

3. Attempt any *one* part of the following: **07 x 1 = 07**

a.	Explain different types of photovoltaic cells used in energy harvesting.	CO1	K1
b.	Discuss how electric power is generated in a PV cell using a diagram.	CO1	K2

4. Attempt any *one* part of the following: **07 x 1 = 07**

a.	Explain the electromechanical modeling using the lumped parameter model.	CO2	K2
b.	Compare lumped parameter and distributed parameter models.	CO2	K2

5. Attempt any *one* part of the following: **07 x 1 = 07**

a.	Describe the process of scaling in electromagnetic energy harvesting.	CO3	K2
b.	Discuss steady-state operation in nonlinear energy harvesting systems.	CO3	K2

6. Attempt any *one* part of the following: **07 x 1 = 07**

a.	Elaborate on energy conversion and storage in WSN-based energy harvesting.	CO4	K2
b.	Explain with examples how microelectronic circuits are used for energy harvesting.	CO4	K2

7. Attempt any *one* part of the following: **07 x 1 = 07**

a.	Discuss the application of energy harvesting in implanted medical devices.	CO5	K1
b.	Explain how wireless SHM sensor nodes are powered using energy harvesting techniques.	CO5	K2