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BEE654B

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Technologies of Renewable Energy Sources

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the causes of energy scarcity.	7	L2	CO1
	b.	Explain the layers of the sun with a neat sketch.	7	L2	CO1
	c.	Calculate zenith angle of the sun at Bhopal (26.75°N) at 10.30 am on March 11, 2025.	6	L2	CO1
		OR			
Q.2	a.	Write a short note on the following: i) Hour Angle ii) Declination Angle	7	L2	CO1
	b.	Explain the classification of energy resources.	7	L2	CO1
	c.	Discuss the applications of solar thermal energy.	6	L2	CO1
		Module – 2			
Q.3	a.	Write short on solar cooker.	6	L2	CO2
	b.	Explain with a neat sketch Heliostat electric generating plant.	8	L2	CO2
	c.	With a neat sketch, explain the IV characteristics of a solar cell.	6	L2	CO2
		OR			
Q.4	a.	Discuss about photovoltaic panels with appreciate equations.	6	L2	CO2
	b.	Explain solar water heating system with a neat sketch.	8	L2	CO2
	c.	Discuss the advantages and disadvantages of concentrating collectors over flate plate collectors.	6	L2	CO2
		Module – 3			
Q.5	a.	List the advantages and disadvantages of hydrogen energy.	5	L1	CO3
	b.	Explain the hydrogen production, techniques in detail.	10	L2	CO3
	c.	Discuss the benefits of waste recycling system.	5	L2	CO3

		OR			
Q.6	**a.**	List the factors for wind turbine site a selection.	**5**	**L1**	**CO3**
	b.	Explain with a neat sketch dry steam geothermal electric power plant.	**10**	**L2**	**CO3**
	c.	Discuss the factors affecting the selection of a biogas plant.	**5**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	List the advantages and disadvantages of tidal power generation.	**5**	**L1**	**CO4**
	b.	With a neat diagram, explain single basin and two basin tidal power plants.	**10**	**L2**	**CO4**
	c.	Write short notes on characteristics of biomass feed.	**5**	**L2**	**CO4**
		OR			
Q.8	**a.**	List the benefits of biogas.	**5**	**L1**	**CO4**
	b.	Explain with a neat sketch, floating dome type biogas plant.	**10**	**L2**	**CO4**
	c.	Write short note on updraft gasifier.	**5**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Enumerate the advantages and disadvantages of wave power.	**5**	**L1**	**CO5**
	b.	Explain the devices used for harnessing wave energy.	**10**	**L2**	**CO5**
	c.	Explain Rankine cycle with a sketch.	**5**	**L2**	**CO5**
		OR			
Q.10	**a.**	List the applications of OTEC.	**5**	**L1**	**CO5**
	b.	Explain closed cycle and open cycle of ocean thermal energy.	**10**	**L2**	**CO5**
	c.	Write short notes on working of sea wave energy.	**5**	**L2**	**CO5**

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18EE732

Seventh Semester B.E. Degree Examination, June/July 2025
Micro and Nano Scale Sensors and Transducers

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With neat diagram, explain construction of new nano capacitive sensor. **(08 Marks)**
b. With relevant relationships, explain the theory behind new capacitive sensor. **(08 Marks)**
c. Compare the new capacitive sensor with other capacitive sensors for pressure measurement in table format for sensitivity and linearity. **(04 Marks)**

OR

2 a. Derive the relationship between pressure and Inductance in new miniature Inductive pressure sensor. **(08 Marks)**
b. With neat diagram explain structure of new miniature Inductive pressure sensor. **(06 Marks)**
c. With diagram explain the interface circuit used to measure inductance of sensor. **(06 Marks)**

Module-2

3 a. Explain the theory behind new ultrahigh sensitivity acceleration sensor. **(08 Marks)**
b. With neat diagram, explain structure and working of new ultra-high sensitivity acceleration sensor. **(08 Marks)**
c. Explain the principle of working of CO gas sensor. **(04 Marks)**

OR

4 a. With neat diagrams explain the structure of n- channel MOSFET type α - particle smoke detector. **(08 Marks)**
b. With neat circuit, explain how buzzer output can be produced from α - particle source. **(08 Marks)**
c. List the advantages and applications of ultra high sensitivity miniature acceleration sensor. **(04 Marks)**

Module-3

5 a. Obtain the capacitance of ultra –capacitor type moisture sensor from basics. **(08 Marks)**
b. Draw the experimental result plots namely capacitance and conductivity change for % relative humidity rise of ultra moisture sensor. Draw block diagram of the interface circuit used to measure capacitance. Briefly explain. **(08 Marks)**
c. Write any two applications of nano optoelectronic techniques. Compare this microphone with Laser interferometry. **(04 Marks)**

OR

6 a. With neat diagram, explain principle of operation of the advanced optical microphone. Draw the mechanical diagram of the integrated microphone assembly as well. **(10 Marks)**
b. Draw the flowchart used for the image processing of new optical microphone. **(07 Marks)**
c. Draw the unit step function response of the diaphragm of new microphone. **(03 Marks)**

Module-4

7 a. With the help of neat block diagram, explain " Lab on a chip" sensor. **(08 Marks)**

b. With neat diagram, explain porous silicon based sensor for chemical gas vapor detection. **(08 Marks)**

c. Write two reasons for which 'lab on chip' concept is considered as solution. Write any two applications of ' Lab on Chip'. **(04 Marks)**

OR

8 a. With neat diagrams, explain operation of the new magnetic field sensor. **(07 Marks)**

b. Derive the relationship for bending radius 'R' of the generated free electrons in new magnetic field sensor. **(08 Marks)**

c. With the help of neat diagram, explain the experimental setup for testing magnetic field sensor. **(05 Marks)**

Module-5

9 a. With a neat diagram, explain the principle of operation of α - particle icing detector. **(10 Marks)**

b. With a neat complete circuit, used as interface circuit, explain the sensing of the state of MOSFET under various operating conditions. **(10 Marks)**

OR

10 a. Explain the theory behind the determination of the turn ON condition of the MOSFET used in α - particle icing detector. **(10 Marks)**

b. Briefly explain the new technologies attempted to overcome the limitations of optical detectors (any two). What are their limitations? **(05 Marks)**

c. In a α - particle source, it contains $10\mu C_i$ of 241 Am. If 20% of the emitted α - particles will reach the electrode. calculate the minimum steady state current expected to reach the gate of the MOSFET. (Hint: Helium has 2 protons) **(05 Marks)**

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