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Code No. : 15157 (I) N/O

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD**

Accredited by NAAC with A++ Grade

**B.E. V-Semester Main & Backlog Examinations, Jan./Feb.-2024****Solar Power and Applications (OE-III)**

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B****Part-A (10 × 2 = 20 Marks)**

Q. No.	Stem of the question	M	L	CO	PO
1.	What are the newly installed and shutdown capacities of various power plants in India.	2	1	1	1
2.	List out the main features of non-conventional energy sources	2	1	1	1
3.	Write Plank's black body radiation formula and explain its terms.	2	2	2	1
4.	Draw the solar spectrum and briefly explain its ranges.	2	2	2	1
5.	Specify the advantages and limitations of active and passive solar heating systems	2	2	3	1
6.	Draw the diagram of the solar pond electric power plant.	2	2	3	2
7.	Define the fill factor and solar cell efficiency of a PV cell.	2	1	4	2
8.	Describe the roles of a bypass diode and a blocking diode in a PV module.	2	2	4	2
9.	List out the advantages of solar PV used in transportation systems like electric vehicles (EV)	2	2	5	2
10.	A battery having a voltage of 48V is in series with a 10 ohm resistance. Across the terminals of this series system, a load $R_L$ is connected. The maximum power that can be transferred to $R_L$ is?	2	2	5	2
<b>Part-B (5 × 8 = 40 Marks)</b>					
11. a)	Discuss the events and factors behind the oil crisis of 1973.	4	1	1	1
b)	Illustrate the non-conventional energy sources and explain their importance in the context of global warming.	4	2	1	2
12. a)	Explain extraterrestrial and terrestrial radiations on the solar spectrum with a neat sketch.	4	3	2	1
b)	Explain the construction and principle of operation of Sunshine Recorder with the help of a neat sketch.	4	3	2	2
13. a)	Explain the different types of solar collectors for water heating systems with neat sketches.	4	3	3	2

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	b)	Explain box type and parabolic type solar cookers with neat sketches and also write their use home applications	4	4	3	2
14.	a)	Explain the effect of partial shading of the PV system with the bypass diodes and blocking diodes	4	3	4	1
	b)	Explain the main features of different types of solar cells based on the active material used in their fabrication.	4	4	4	2
15.	a)	With the help of block diagrams, discuss the operations of standalone and grid interactive solar PV systems.	4	2	5	1
	b)	Explain the standalone system by MPPT, non MPPT, shutdown and battery-only modes.	4	3	5	2
16.	a)	Illustrate the advantages and limitations of non-conventional sources of energy and explain	4	2	1	1
	b)	Define solar constant, solar insolation, diffuse radiation and explain the effect of atmospheric factors on incident irradiation.	4	1	2	1
17.		Answer any <i>two</i> of the following:				
	a)	Discuss the operation of solar thermal water pump for different outdoor applications with neat sketches.	4	2	3	1
	b)	Explain how the variation of insolation and temperature affects the I-V and P-V characteristics of a solar cell.	4	3	4	2
	c)	List out the applications of medical refrigeration and village power using solar PV systems.	4	2	5	1

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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