

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, May 2018**

**Course: Fundamentals of Nanotechnology**  
**Program: B.Tech ETL LB IPR**  
**Time: 03 hrs.**

**Semester: VI**

**Max. Marks: 100**

**Instructions: Your answer should be concise and to the point.**

**SECTION A (All questions are compulsory)**

Q1	What do you understand by the term Artificial Photosynthesis?	[4]	CO3
Q2	Write a brief note on Ethics in Science.	[4]	CO4
Q3	“No more Spiderman window cleaner”. Explain.	[4]	CO3
Q4	List out some factors that limit the efficiency of solar cells.	[4]	CO3
Q5	Explain quantum confinement on the basis of Bohr’s radius.	[4]	CO1

**SECTION B (Question 9 has internal choices.)**

Q6	Give a method for the production of Hydrogen gas using solar energy.	[10]	CO3
Q7	Discuss in brief the construction and working of a Nanoindenter.	[10]	CO2
Q8	A solar cell of area 1 cm <sup>2</sup> receives solar radiation having an intensity of 0.9mW/cm <sup>2</sup> . Measurements show that at 25°C the open circuit voltage, the short circuit current and maximum current are 0.24V, 9 mA and 6 mA respectively. The efficiency of the cell is 25%. Calculate the maximum voltage that the cell can give and find the fill factor.	[10]	CO3
Q9	Explain the construction and working of Transmission Electron Microscope. <b>OR</b> Write a brief note on the use of Nanotechnology in energy storage devices.	[10]	CO3

**SECTION-C (Question 11 has internal choices.)**

Q10	(a) Give the construction and working of a silicon solar cell. (b) Discuss in detail the working principle and construction of X-Ray Diffractometer.	[10] [10]	CO3 CO2
Q11 (a)	(i) How nanotechnology is being used in Solid State Lighting. What are its advantages over the conventional lighting systems? (ii) Discuss the implications of Nanotechnology on environment.	[10] [10]	CO3 CO4
Q11 (b)	<b>OR</b> (i) Explain the potential impacts of Nanotechnology on pipeline transmission of Petroleum and natural gas. (ii) Write in brief on the status of nanotechnology in national scenario.	[10] [10]	CO3 CO4

Name:

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**SECTION A (All questions are compulsory)**

Q1	What do you understand by the term self-cleaning windows?	[4]	CO3
Q2	Explain the role of Ethics in science.	[4]	CO4
Q3	Write a brief note on Auger effect.	[4]	CO3
Q4	What is the role of vacuum during synthesis of nanomaterials?	[4]	CO1
Q5	Explain in brief the Photovoltaic effect.	[4]	CO3

**SECTION B (Question 9 has internal choices.)**

Q6	Explain the use of Nanotechnology in power transmission lines	[10]	CO3
Q7	What are CNTs? What are the different flavors of CNTs? Give some applications of CNTs.	[10]	CO2
Q8	A solar cell of area 2 cm <sup>2</sup> receives solar radiation having an intensity of 0.9mW/cm <sup>2</sup> . Measurements show that at 25°C the open circuit voltage, the short circuit current and maximum current are 0.24V, 9 mA and 6 mA respectively. The efficiency of the cell is 20%. Calculate the maximum voltage that the cell can give and find the fill factor.	[10]	CO3
Q9	Discuss the different ways by which white light can be generated through LED. <p style="text-align: center;"><b>OR</b></p> Discuss some methods to split water with sunlight for hydrogen production	[10]	CO3

**SECTION-C (Question 11 has internal choices.)**

Q10	(a) Explain the different processes that are involved in the preparation of a solid sample to be characterized by TEM.	[10]	CO3
	(b) Discuss the working of Atomic Force Microscope. What is its advantage over Scanning Tunneling Microscope?	[10]	CO2
Q11 (a)	(i) List out the different ways in which we can harvest the solar energy? Explain them briefly.	[10]	CO3
	(ii) "Exposure to nanomaterials is dangerous to human health and ecosystem". Explain.	[10]	CO4
Q11 (b)	<b>OR</b>		
	(i) Compare the various Physical and Chemical routes for the synthesis of nanomaterials.	[10]	CO3
	(ii) Write a note on the status of nanotechnology in International scenario.	[10]	CO4