Name: **Enrolment No:**	UPES

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

Course: **Advanced Applications of Nanotechnology** **Semester: VIII**
Program: **B.Tech-MSNT**
Time: **03 hrs.** **Max. Marks: 100**

SECTION A

S. No.		Marks	CO
Q 1	Click chemistry is useful for the percentage detection of click based self-healing coatings. Explain with example.	**4**	**CO1**
Q 2	Describe the chemical reaction in Fuel Cell and Electrolysis Cell	**4**	**CO2**
Q 3	TiO_2 nanoparticles decompose the organic pollutants, and thus are helpful to prepare the self-cleaning windows. Show the mechanism to achieve this concept.	**4**	**CO3**
Q 4	Explain the production of copper Nano-fluids and their application	**4**	**CO3**
Q 5	Give a synthetic route for zero-valent iron (nZVI) including its application for water purification.	**4**	**CO1**

SECTION B

Q 6	Explain the importance of nanotechnology in the following: (a) Cleaning up oil spills (b) Nano-lubricants	**10**	**CO1**
Q 7	Cooling is one of the top technical challenges, faced by high-tech industries such as microelectronics, transportation, and manufacturing. Suggest a solution through nanotechnology.	**10**	**CO3**
Q 8	Electrolyte and operating temperature are key factors for Fuel Cells. Classify Fuel Cells on this basis.	**10**	**CO2**
Q 9	What kind of fluids, nanoparticles (metallic, oxide and carbon) and surfactants can be used (name 3 of each) to prepare the nanofluids?	**10**	**CO4**

SECTION-C

Q 10	A. Explain the application of nano technology for converting heavy oils to clean transportation fuels. *Or* Give a comprehensive mechanism of Bio-desulfurization (BDS) of dibenzothiophene (DBT) including the detail of used nanoparticles and bacteria.	**10 + 10**	**CO2, CO3, & CO4**

	B. Describe the operating principle of dye sensitized solar cells. What role does nanotechnology play for enhancing the efficiency of solar cells. *Or* What are self-cleaning, dirt and water repellent coatings? How are the desired properties achieved for this propose through nanotechnology		
Q 11	Fill the table as per given columns.	**20**	**CO1, CO2, CO3, & CO4**

No.	Area	Nano-materials	Advantages
1	Paint		
2	Automobile		
3	Building		
4	Furniture		
5	Cloth		
6	Arsenic removal		
7	Food		
8	Drilling		
9	Reservoir Surveillance		
10	Soil Treatment		
11	Nuclear waste		
12	Space		
13	Dieting		
14	Tumor		
15	Garden		
16	Packaging		
17	Cosmetics		
18	Windows		
19	Refrigerators		
20	Toys		

Name: **Enrolment No:**	UPES

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

Course: **Advanced Applications of Nanotechnology** **Semester: VIII**
Program: **B.Tech-MSNT**
Time: **03 hrs.** **Max. Marks: 100**

SECTION A

S. No.		Marks	CO
Q 1	Provide numerical explanation about the relation of viscosity and temperature for a high performance nano-lubricant.	**4**	**CO1**
Q 2	What role nanoreporters and nanorobots play in oil industry?	**4**	**CO2**
Q 3	How are quantum dots more useful than commercial approaches for tumor selective cancer treatment?	**4**	**CO3**
Q 4	Describe the role of silver nanowires for water sterilization.	**4**	**CO3**
Q 5	Distinguish between extrinsic and intrinsic techniques and their role in self-healing.	**4**	**CO1**
	SECTION B		
Q 6	Which model (Tip-growth or Base-growth) is more useful to synthesize an open end carbon nanotubes? Discuss with suitable justification.	**10**	**CO1**
Q 7	Explain polymeric micelles formation including their role for temperature and pH responsive targeted drug release.	**10**	**CO3**
Q 8	Show the bio-desulfurization of dibenzothiophene (DBT) with a comprehensive mechanism.	**10**	**CO2**
Q 9	Describe the working principle of Dye Sensitized Solar Cells (DSSC) including the role of nanotechnology for increasing the efficiency of solar cells.	**10**	**CO4**
	SECTION-C		
Q 10	Explore the application of nanotechnology in the following areas; (i) Reservoir surveillance (ii) Automobile sector (iii) Hydrogen storage (iv) Nuclear waste management	**20**	**CO2, CO3 & CO4**
Q 11	A. How are electric field responsive nano-hydrogels more useful for targeted drug delivery as compared to conventional hydrogels. *Or* Describe the role of graphene oxide and reduced graphene oxide nanosheets with respect to cationic and anionic dyes for removal of dyes from industrial waste.	**10 + 10**	**CO2, CO3, & CO4**

	B. Detail various methods for synthesis of dendrimers including their advantages as drug carriers. *Or* Describe the advantages of Pd nanoparticles immobilization on zero-valent iron for dehalogenation of water.		