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**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**

**End Semester Examination, December 2017**

<b>Program:</b>	<b>MSENT</b>	<b>Semester –</b>	<b>V</b>
<b>Subject (Course):</b>	<b>Nano Material Processing</b>	<b>Max. Marks</b>	<b>: 100</b>
<b>Course Code :</b>	<b>MTEG 333</b>	<b>Duration</b>	<b>: 3 Hrs</b>
<b>No. of page/s:</b>	<b>2</b>		

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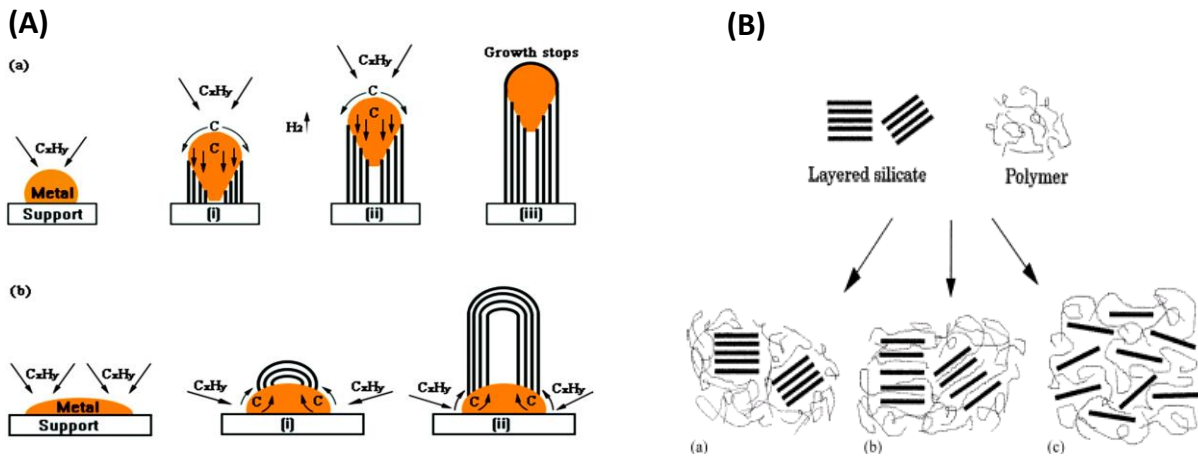
**SECTION: A [Total-20 Marks]**

**Q.1.** Fill in the blanks/Objectives/True [T]-False [F]: 1 Mark each [**Total-10 Marks**]

1. Methyl ethyl ketone (MEK) is a positive photoresist stripper [T/F].
2. High current density of graphene is .....
3. Graphene based scaffold is useful to enhance the catalytic activity of metal particles [T/F].
4. As a particle increase in size, a great proportion of atoms are found at the surface compared to those inside [T/F].
5. Addition of CNTs enhances the thermal conductivity of composites [T/F].
6. Fluorogenic click reaction can be measured using UV spectroscopy [T/F].
7. Techniques for dispersing nano-fillers and measuring degree of dispersion pose the biggest challenge for nano-industry [T/F].
8. Viscosity of nano-fluids increases with temperature [T/F].
9. Water can be used as a base fluid to prepare the nano-fluids [T/F].
10. Polymer nanocomposites with CNT based filler can .....tensile nature of hybrid.

[A] Reduce [B] Improve [C] No change [D] NOTA

**Q.2.** Explain the following Figures: 5 Marks each [**Total-10 Marks**].



**SECTION: B [Total-40 Marks]**

**Q.3.** Describe the working principle of Molecular Beam Epitaxy (MBE) including its advantages and disadvantages. [10 Marks]

**Q.4.** A detailed nomenclature of carbon nanotubes (CNTs) and describe two synthesis techniques for CNT preparation. [10 Marks]

**Q.5.** Describe any three photoresist coating techniques including their comparison in terms of coating parameters, and resin uniformity. [10 Marks]

**Q.6.** Classification of magnetic materials. Also describe the term bio-magnetism including two examples. [10 Marks]

**SECTION: C [Total-40 Marks]**

**Q.7.** Explain any three Ball Milling processes for the synthesis of metal nanoparticles including their advantages and disadvantages. [20 Marks]

**Q.8.** Describe the role of nano-fluids for heat transfer enhancement. Also what kind of fluids, nanoparticles, and surfactant can be used (name 3 of each) to prepare the nano-fluids. [20 Marks]

**Or**

Describe the synthesis of graphene oxide using Hummers method. Also calculate the number of graphene layers when  $2\theta$  peak is at  $12.6^\circ$ ,  $K$  is  $0.9$ , and  $\beta$  is  $8.6 \times 10^{-3}$ . [20 Marks]