

M.E. METALLURGICAL ENGINEERING 1ST YEAR 2nd SEMESTER EXAM-2024

1st year, 2nd Semester, Examination 2024

NanocompositesAttempt any five questions

Full Marks-100

1.	(a) What are the different classes of ceramic nanocomposites? Write advantages of ceramic nanocomposites over ordinary composite materials. (b) Discuss the steps of synthesis of ceramic nanocomposites using a high energy ball mill. Name the high energy ball mills that are suitable for nanocomposite synthesis. (c) What is mechanochemical reaction? Discuss the kinetics of mechanochemical reaction. Why this reaction is possible to achieve in ball milling?	2 + 2 5 + 2 2 + 4 + 3
2.	(a) What are encapsulated composite nanosystems? Discuss the synthesis strategies of different types of encapsulated composites nanosystems. What are the advantages of formation of this type of nanocomposites? (b) Explain why extremely high hardness can be achieved in multilayer and granular nanocomposite coating? (c) Write short note on CNT based ceramic nanocomposites.	2 + 6 + 2 6 4
3.	(a) What are the different types of fillers added into polymer matrix to produce polymer nanocomposites? Compare among these fillers. (b) Discuss the factors which are responsible for the improvement of mechanical properties of polymer nanocomposites for all the three different types of fillers.	3 + 4 5 + 5 + 3
4.	(a) "Modification of the nano fillers before addition into the polymer matrix for processing of polymer nanocomposite is very important." - Justify the sentence for all the types of nano fillers. (b) Discuss in detail with diagram the modification of nano clay layers before addition into the polymer matrix.	2 + 2 + 2 14

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5.	<p>(a) What are the different methods of modification of equi-axed nano particles before addition into the polymer matrix?</p> <p>(b) highlight all the routes of processing of equi-axed nanoparticle polymer nanocomposite.</p>	<p>10</p> <p>10</p>
6.	<p>(a) What are the different synthesis techniques of CNT for polymer / CNT Nanocomposites?</p> <p>(b) Discuss the modification strategies of CNT for polymer CNT nanocomposites.</p>	<p>8</p> <p>12</p>
7.	<p>(a) What are the main features of nanostructured coating formed by thermal spray method?</p> <p>What are the critical parameters in the deposition of nanocomposite coating by the above mentioned technique?</p> <p>Compare the different thermal spray methods for deposition of nanocomposite coatings.</p> <p>(b) What are functional low dimensional nanocomposites? What are the applications of this types of nano composites? What is the synthesis strategy of this type of nanocomposites?</p>	<p>3 + 3 + 4</p> <p>2 + 2 + 6</p>