

SL.NO:1318

SUBJECT CODE:17PHBS02

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022
BIOTECHNOLOGY
NANOTECHNOLOGY

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Draw a quantum wire and what is its dimension theoretically?
- 2 Explain any two applications of nanotechnology.
- 3 Identify the reasons for the effect of size on the physical properties in a nanomaterial.
- 4 Discuss the advantages and disadvantages of Ball milling method.
- 5 Discuss about Sputtering technique.
- 6 Discuss shortly about Photo resists.
- 7 Discuss the types of lithography.
- 8 Express the term HiPCO.
- 9 Discuss the information get from SEM.
- 10 Discuss nano indentation cope.

Answer **Any FIVE** questions
Part-B (5 x10 =50 Marks)

- 11 a. Determine the various factors which cause toxic and biohazards
OR
b. Determine the functionality and applications of scanning tunnelling microscope.
- 12 a. Illustrate Physical Vapour Deposition technique with a neat diagram.
OR
b. Illustrate the method of growing thin film using evaporation technique.
- 13 a. Illustrate the process of etch resist lithography with its application.
OR
b. Illustrate the process of synthesizing CNT by laser ablation method.
- 14 a. Illustrate the techniques used for surface morphology and explain any one type with neat sketch.

OR

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- b. Explain the classification of nanostructures materials in the context of Quantum confinement in detail.
- 15 a. Describe the recent trends in nanoscience and technology in the field of textile, agriculture and medicine.

OR

- b. Discuss the effect of size reduction on the various properties of a material with examples.
- 16 a. Write a note on thin films and multilayered materials. Discuss any two methods of thin film deposition techniques in detail.

OR

- b. Explain briefly about dip-pen lithography with its advantages
- 17 a. Explain electrical property of CNT with an example.

OR

- b. Describe SWCNT? Draw its structure and types of SWCNT.
- 18 a. Describe briefly about x-ray diffraction technique.

OR

- b. Explain in detail about the study of surface analysis using scanning probe microscopy.

Answer ALL questions

PART-C (2 x 15 = 30)

- 19 a. Illustrate the method of growing a thin film using Molecular Beam Epitaxy with its advantages.

OR

- b. Discuss the Importance of Nanoscience and Technology in various fields and its application.
- 20 a. Explain the process of optical lithography with neat diagram with its advantages and disadvantages.

OR

- b. Describe Chemical Vapor Deposition technique with a neat diagram with its advantages and disadvantages.

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SL.NO:1310

SUBJECT CODE:17PHBS08

VINAYAKA MISSIONS RESEARCH FOUNDATION
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B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022
MECHANICAL ENGINEERING

FUNDAMENTALS OF NANO SCIENCE

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Differentiate SEM and TEM.
- 2 Restate about Quantum dots.
- 3 Describe multi-layered materials.
- 4 Explain the contamination time arise in Attritor milling.
- 5 Discuss sputtering and its types.
- 6 Describe about the pattern transferring in lithography.
- 7 Describe briefly about dip-pen lithography.
- 8 Discuss chemical contamination.
- 9 Discuss characterization of Nanomaterials.
- 10 Discuss the principle of SIMS.

Answer **Any FIVE** questions
Part-B (5 x10 =50 Marks)

- 11 a. Demonstrate the applications of Nanomaterials in various fields.
OR
b. Demonstrate the properties, synthesis methods and applications of multi-layered materials.
- 12 a. Demonstrate electro-deposition method for synthesis of nanostructures.
OR
b. Describe the sputtering technique in nanoparticle synthesis.
- 13 a. Illustrate the facilities and service required for the nano research laboratory.
OR
b. Demonstrate the construction and working of Scanning Probe Microscopy (SPM) with a neat sketch.

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- 14 a. (i) Discuss the term Nano scale materials.(ii) Cite the characteristics of Nano scale materials.

OR

- b. Explain how the Optical, Thermal and Magnetic properties of Nanomaterials vary with geometry.

- 15 a. Explain in detail about the implications of Nanoscience and technology for Biology and Engineering.

OR

- b. Give an overview of photolithography.

- 16 a. Discuss e-beam lithography.

OR

- b. Differentiate wet and dry etching in lithography.

- 17 a. Discuss in brief about the preparation environment of Clean room.

OR

- b. Describe various factors that influence the selection of vibration isolators.

- 18 a. Discuss the working of ESCA with its applications and give its advantages and disadvantages.

OR

- b. Summarize the modes of Scanning Near field Optical Microscopy (SNOM) and its applications.

Answer ALL questions

PART-C (2 x 15 = 30)

- 19 a. (i) Classify Nanostructured materials with suitable examples. (ii)Analyze the effects of nanotization on the properties of materials.

OR

- b. Demonstrate the optical/UV lithography method of device fabrication.

- 20 a. Explain the properties, synthesis methods and applications of (i) Ultra-thin films (ii) Multi-layered materials.

OR

- b. Explain in detail various factors to be considered for a Clean room. Based on the above, provide the safety measures.

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SL.NO:1249

SUBJECT CODE:17PHBS04

VINAYAKA MISSIONS RESEARCH FOUNDATION
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B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022
BIOMEDICAL ENGINEERING

MEDICAL PHYSICS

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Differentiate ionizing and non-ionizing radiation.
- 2 List down the type of particles of radiation emitted in radioactivity.
- 3 Mention the types of non-lethal changes observed in cell due to radiation dose.
- 4 Define the term LD50/30.
- 5 List down the gene controlled hereditary diseases.
- 6 Underline the characteristics of laser.
- 7 With suitable examples identify isotopes and isobars.
- 8 Distinguish the two types of somatic effects of radiation.
- 9 Report the effects of lethal dose on endocrinal glands.
- 10 Restate the principle of photo dynamic therapy (PDT).

Answer **Any FIVE** questions
Part-B (5 x10 =50 Marks)

- 11 a. Analyze various radiation damages occurred in chromosome.
OR
b. Analyze the different kinds of DNA damage due to radiations.
- 12 a. Compare Genetic and somatic effects on nuclear radiation.
OR
b. Demonstrate the construction and working of any one of the particle accelerators
- 13 a. Demonstrate the depression of macromolecular synthesis due to radiation exposure.
OR
b. Illustrate the effect of nuclear radiation on living cells.

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14 a. Display the types of radiation dose and effects applied in somatic cells.

OR

b. Interpret the consequences of radiation damage to the somatic cells.

15 a. State and demonstrate the genetic effect of radiation.

OR

b. Illustrate various methods for limiting internal and external exposure of radiation.

16 a. Demonstrate the concept and procedure of photo chemotherapy in detail.

OR

b. Demonstrate the biological effects of laser in eye damage and skin damage.

17 a. Explain the properties of an atom in detail.

OR

b. Explain the different types of decay with one example in each.

18 a. Discuss the mechanism and assumptions of single hit on multi target model of tissue.

OR

b. Explain the principles of working of a LASER.

Answer ALL questions

PART-C (2 x 15 = 30)

19 a. Interpret in detail about the production and applications of artificial radioisotopes.

OR

b. Demonstrate the effect of LD50/30 radiation on embryo and fetus.

20 a. Relate various factors with the frequency of radiation in induced mutations.

OR

b. With suitable diagrams, explain the various types of dose-response curves.

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SL.NO:1119

SUBJECT CODE:17PHBS05

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022
COMMON TO ALL
SMART MATERIALS

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Demonstrate, how the Metallic glasses can be used for transformer core materials?
- 2 Explain briefly about transformation temperature in SMA.
- 3 Distinguish between Type I and Type II Superconductors.
- 4 Interpret unit cell.
- 5 Demonstrate top-down and bottom-up approach for producing nanoparticles.
- 6 Interpret any two techniques for the synthesis of nanophase materials.
- 7 Explain briefly about top-down approach.
- 8 Describe coercivity and retentivity.
- 9 Explain briefly about soft magnetic materials.
- 10 Identify the reason, why the superconductor exhibits the property of diamagnetism?

Answer **Any FIVE** questions
Part-B (5 x10 =50 Marks)

- 11 a. Categorize metallic glasses? Give examples. Mention the properties of metallic glasses.

OR

- b. Draw the unit cells of SC, BCC, FCC and HCP structures

- 12 a. Examine the effects of temperature, magnetic field and current on the superconductivity.

OR

- b. Schedule the following for SC, BCC, FCC and HCP structures

- 13 a. Explain the properties of diamagnetic materials with neat diagram.

OR

- b. Explain two characteristics of SMA with neat diagrams.

- 14 a. Explain the properties of Ni-Ti alloy.

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OR

- b. Express the outline of magnetic and electrical properties of metallic glasses. Mention any two applications of metallic glasses.

- 15 a. Describe the following (i) unit cell (ii) coordination number (iii) nearest neighbour distance (iv) packing factor

OR

- b. Explain the advantages, disadvantages and applications of ball milling method.

- 16 a. Explain Carbon Nano Tubes? How are they classified? Explain.

OR

- b. Explain in detail about any one of the methods of fabrication of CNT.

- 17 a. Differentiate the properties of dia, para and ferromagnetic materials

OR

- b. Discuss the properties of superconductors.

- 18 a. Describe about Type – I super conductor. Write down its characteristics.

OR

- b. Discuss Isotope Effect and Meissner effect.

Answer ALL questions**PART-C (2 x 15 = 30)**

- 19 a. Categorize hard and soft magnetic materials? Mention their applications.

OR

- b. Generalize the properties of metallic glasses.

- 20 a. Illustrate sol-gel method of preparing nanophase materials and mention its advantages.

OR

- b. Illustrate hysteresis on the basis of domain theory.

VINAYAKA MISSIONS RESEARCH FOUNDATION

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B.E.DEGREE EXAMINATIONS- FEB - 2022

**COMMON TO ALL
PHYSICAL SCIENCES**

(Candidates admitted under 2017 Regulations-SCBCS)

Time : 1 1/2 Hours

Maximum Marks:50 Marks

PART A - ENGINEERING PHYSICS

Answer **ALL** questions

Part-A (5 x 2 =10 Marks)

- 1 Tell about population inversion.
- 2 Schedule any two applications of laser in industrial field.
- 3 Report about step index fiber.
- 4 Tell about the characteristics of graded index multimode fiber.
- 5 Interpret about X-ray Fluoroscopy.

Answer **Any FIVE** questions

Part-B (2 x12 =24 Marks)

- 6 a. Predict the applications of laser in communication, military and chemical fields.
OR
- b. Recognize the following terms: population inversion, pumping process and laser action.
- 7 a. Express the various types of fibers based on refractive index profile.
OR
- b. Express the characteristics of penetrant.

Answer **ALL** questions

PART-C (1 x 16 = 16)

- 8 a. Demonstrate the construction and working of semiconductor laser with necessary diagram.
OR
- b. Illustrate the working of X-ray radiography.

PART A - ENGINEERING CHEMISTRY
(Candidates admitted under 2017 Regulations-SCBCS)

Time : 1 1/2 Hours

Maximum Marks:50 Marks

Answer **ALL** questions
Part-A (5 x 2 =10 Marks)

- 1 Brief the terms electrolytic and electrochemical cell.
- 2 What is helmholtz's electrical double layer?
- 3 Show the structure of EDTA and Ca-EDTA complex.
- 4 Mention the causes of boiler corrosion
- 5 Write a note on solar energy

Answer **Any FIVE** questions
Part-B (2 x12 =24 Marks)

- 6 a. Explain standard electrode potential in detail.

OR
- b. Calculate the emf of the cell $\text{Mg}/\text{Mg}^{2+} // \text{Cd}^{2+} (\text{aq}) / \text{Cd}(\text{s})$ at 25°C where, $[\text{Cd}^{2+}] = 0.7\text{M}$, $[\text{Mg}^{2+}] = 1.0\text{M}$ and $E^{\circ}_{\text{cell}} = 1.97 \text{ V}$.
- 7 a. Discuss in detail dry corrosion with mechanism.

OR
- b. Describe producer gas in detail.

Answer **ALL** questions
PART-C (1 x 16 = 16)

- 8 a. Explain the working principle of $\text{H}_2\text{-O}_2$ fuel cell with reactions.

OR
- b. Elaborate the non-conventional energy sources.

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SL.NO:1078

SUBJECT CODE:17PHSE01

VINAYAKA MISSIONS RESEARCH FOUNDATION
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B.E./ B.TECH DEGREE EXAMINATIONS- FEB -2022
MECHATRONICS
ELE - ENERGY PHYSICS

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Discuss the effect of air pollution on human health.
- 2 What is the average range of solar radiation received on the earth's surface during day?
- 3 How the wind mills are classified?
- 4 Define Pitch angle.
- 5 What are the methods used to analysis of biomass?
- 6 Name the materials used in bio gas generation.
- 7 What is an Electrolyte?
- 8 Define Specific Energy.
- 9 What are the steps of energy conservation planning?
- 10 List out the energy management techniques?

Answer **Any FIVE** questions
Part-B (5 x10 =50 Marks)

- 11 a. Explain the principle and operation of non convective solar pond in detail.
OR
b. Explain briefly the functioning of Darrieus Wind Turbine
- 12 a. What is biomass direct combustion? Explain in detail.
OR
b. What is meant by fermentation, aerobic, anaerobic digestion? Explain.
- 13 a. Explain with a neat sketch the production process of biogas indicating its composition & calorific value. □
OR
b. Explain the Lead-acid battery charge operation.
- 14 a. Explain the Lead-acid battery discharge operation.
OR
b. Explain different modes of hydrogen transportation and utilization of hydrogen gas.
- 15 a. Explain in brief about the following. a) Primary and secondary energy sources

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OR

b. Explain in detail about energy management strategies for industry

16 a. Assess the need of renewable energy resources.

OR

b. Enumerate the different types of concentrating type collectors

17 a. Classify the wind energy systems and explain their working with neat sketch

OR

b. Define the following: i) Latitude ii) Declination angle
iii) Surface azimuth angle iv) Hour angle v) Zenith angle.

18 a. Write short notes on Hydrogen storage.

OR

b. Write brief note on Hydrogen technology development in India

Answer ALL questions

PART-C (2 x 15 = 30)

19 a. With a suitable block diagram, explain the functions of different components of WECS.

OR

b. Explain how the wind energy data are collected and energy available in the wind is estimated

20 a. Explain in detail about performance parameters of cogeneration systems.

OR

b. With a neat diagram of a bio-gas plant write its construction and working?

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