**11**

DE–3587

DISTANCE EDUCATION

M.Phil. (Physics) DEGREE EXAMINATION, MAY 2008.

Non-Semester

RESEARCH METHODOLOGY AND PROGRAMMING

(2006 batch)

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

1. (a) Explain the role of the supervisor in identifying the research problem.
   1. (b) Elaborate the points to be taken care of by the researcher in solving the research problem.
2. (a) Explain Newton-Raphson method and obtain the formula.
   1. (b) Find the root of the equation  to three decimal places using Newton-Raphson method.
3. (a) Derive Simpson’s three-eighth’s rule using Newton-Gregory forward formula.
   1. (b) Evaluate the integral  using the Simpson’s  rule.
4. (a) Write delay subroutine with register pairs in assembly language program.
   1. (b) Write an assembly language program to multiply two numbers.
5. What is meant by interfacing? Describe in detail interfacing of stepper motor with the microprocessor 8085 with relevant diagrams.
6. (a) Sketch Intel 8086 pin configuration and explain the function of each pin.
   1. (b) Explain the various interrupts available in 8086 with examples.
7. (a) Explain in detail various logical operators available in C language with examples.
   1. (b) Discuss the functions of ‘‘printf’’, ‘‘Gets’’ and ‘‘Puts’’.
8. Describe the syntax for opening and closing a data file in C language. Explain in detail the method of creating and processing a data file with suitable examples.

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**12**

DE–3588

DISTANCE EDUCATION

M.Phil. (Physics) DEGREE EXAMINATION, MAY 2008.

Non-Semester

ADVANCED PHYSICS

(2006 batch)

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

Each question carries 20 marks.  
 (5 × 20 = 100)

1. Quantize the non-relativistic Schrödinger equation for fermions of mass m moving in potential field.
2. Quantize electromagnetic field in free space and develop the concept of photon as a entity carries discrete amount of energy and momentum.
3. What is meant by localized bonds? Explain in detail about the merits and demerits of different theories.
4. (a) Mention advantages of optical fiber as waveguide over conventional metallic waveguide. (10)

(b) A silica optical fiber has a core refractive index of 1.50 and a cladding refractive index of 1.47. Determine,

(i) the critical angle at the core cladding interface,

(ii) the N.A. for the fiber and

(iii) the acceptance angle in air for the fiber. (10)

1. (a) Discuss the different scattering losses in SiO2 fiber at the operating wavelengths. (15)

(b) Calculate the total number of guided modes propagating in the multimode step index fiber having diameter of 50 m and numerical aperture of 0.2 and operating at a wavelength of 1m. (5)

1. (a) Mention any four required properties of light sources used in the optical communication. (5)

(b) What are direct band gap and indirect band semiconductors? Give example. (10)

(c) Why do we prefer laser diodes over LEDs for communication applications? (5)

1. (a) Discuss the different mechanisms involved to produce laser emission. (5)

(b) Describe the construction and working of Nd YAG laser. (15)

1. (a) Estimate the power delivered to different types of fibers with respect to LEDs. (5)

(b) Why laser emission is not obtained in atomic system under thermal equilibrium? (7)

(c) Explain RZ and NRZ coding and their effects on bit rate. (8)

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**131 A**

DE–3589

DISTANCE EDUCATION

M.Phil. DEGREE EXAMINATION, MAY 2008.

Non-Semester

Physics

MATERIALS PHYSICS

(2006 batch)

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.   
 (5 × 20 = 100)

1. Define electric susceptibility. Explain in detail the classical treatment of electric susceptibility for independent systems.
2. What is g-factor? Discuss the structure determination procedure for amides and nitriles using g-factor.
3. Draw the cole-cole plot for a RC combination and discuss its salient features. Explain the impedance measurement technique with the necessary theory.
4. Explain different methods of measurement of dielectric constant for solids with the necessary theory.
5. Discuss the physical properties of H-bonded systems. Explain the quantum mechanical model and obtain potential curves for H-bonded systems.
6. Describe in detail various IR group frequencies and its importance in the study of molecular structure.
7. What are LB films? How it is different from an ordinary thin film? Explain the method of preparation of LB films with necessary diagrams.
8. Explain the optical properties of LB films with an example. Discuss the method of analysis of band gap energy from the optical transmittance.

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**132 B**

DE-3590

DISTANCE EDUCATION

M.Phil. DEGREE EXAMINATION, MAY 2008.

Non-Semester

Physics

CRYSTAL GROWTH

(2006 batch)

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

(5 × 20 = 100)

1. What are primary nucleation and secondary nucleation? Discuss the formation of edge dislocation and screw dislocation during the crystal growth process. Explain with necessary diagrams.
2. Define solubility. Explain the method of measurement of supersaturation and discuss with Meir's solubility diagram.
3. Explain the mechanism of gel formation in silica gel media and discuss the method of crystal growth using U-tube. List the merits and demerits of gel growth.
4. What is meant by zone refining? Describe the method of zone refining process and explain how purification is achieved?
5. Describe the crystal growth process using crystal pulling technique. What are the requirements and restrictions in this method?
6. Explain the principles of flux growth technique. Discuss about choice of flux with an example. List the merits and demerits in flux growth.
7. Discuss the mechanism of chemical vapour deposition. Describe a method of growing single crystals by chemical vapour deposition technique. What is the uniqueness in this method?
8. Write notes on the following :

(a) Critical size in nucleation

(b) Molecular beam method.

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**133 (C)**

DE–3591

DISTANCE EDUCATION

M.Phil. DEGREE EXAMINATION, MAY 2008.

Non–Semester

Physics

APPLIED SPECTROSCOPY

(2006 batch)

Time : Three hours Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

1. (a) Explain the basic functions of radiation sources. Discuss the vital features of the radiation sources :

(i) hydrogen discharge lamp and

(ii) incandescent filament lamp.

(b) Describe the construction and working of photomultiplier tube.

1. (a) Write a detailed note on interference filters.

(b) What is diffraction grating? Describe its construction, principle of working and how it is used for analyzing spectras.

1. Explain the construction and working of a pneumatic nebulizer. Write a detailed note on flame mission spectrometry.
2. Explain the components and working of a direct current arc. How the sensitivity of the arc can be improved? Describe the construction and working of Echelle grating spectrometer.
3. What are the various infrared radiation sources? Give the general principle of working of Photon detectors. State the merits of this method. Describe the photoconductive and photo voltaic IR detectors used in the analysis of infrared radiation.
4. Describe the different sampling techniques used in IR radiation. Compare Raman and IR spectroscopy. Discuss the polarization measurements.
5. Give the theory of x-ray absorption methods for identifying the presence of elements in a sample. Describe the operation of a nondispersive x-ray absorption meter.
6. What is the basic principle involved in nuclear magnetic spectroscopy? Explain how it helps for the identification of atomic configuration in molecules. Write a note on NMR energy level.

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