LOGANATHA NARAYANASAMY GOVT. COLLEGE (Autonomous), PONNERI – 601 204
APRIL - 2021 SEMESTER EXAMINATIONS
III SEMESTER – M.Sc., PHYSICS

Paper Code : **17PHE3A** Title of the paper : **Elective - Microprocessor - II**

Date : **08.05.2021 AN** Time : **3 Hours** Maximum Mark:**75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer Any **TEN** Questions from the following

1. Explain Bus cycle.
2. Discuss about the different Procedures.
3. Why does dynamic RAM need refreshing?
4. What is meant by Demultiplexing?
5. What do you mean by address pointer table?
6. Differentiate between maskable and non - maskable interrupt.
7. Give the format of TCON register in 8051.
8. Write a program to perform multiplication of two 8-bit numbers using 8051 microcontroller.
9. What is operating system?
10. Give the list of some advanced microprocessors.
11. Which interrupt has the highest priority in 8086 microprocessor?
12. Write about CALL statement in 8051.

PART – B (5 X 5 = 25 Marks)

Answer Any **FIVE** Questions from the following

13. Describe any five addressing modes of 8086 with suitable examples.
14. Discuss about stack segment register and stack pointer.
15. Discuss the interrupt sequence of 8259 Programmable interrupt controller.
16. Discuss about the special registers in microcontroller.
17. List out the difference between 8086 and 80386 microprocessor.
18. Write notes on Assembler Macros.
19. What are the various objectives and functions of operating systems?

PART – C (3 X 10 = 30 Marks)

Answer Any **THREE** Questions from the following

20. Explain the internal architecture of 8086 microprocessor with a neat diagram.
21. Discuss in detail about Hardware organization of the memory address space.
22. Define Interrupt and explain the different types of interrupt supported by 8086.
23. Discuss pin details and architecture of 8051 microcontroller.
24. Draw the flag register of 80386 processor and discuss the register organization of this processor.

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APRIL - 2021 SEMESTER EXAMINATIONS
III SEMESTER – M.Sc., PHYSICS

Paper Code : **17PHE3B** Title of the paper : **Energy Physics**

Date : **21.06.2021 AN** Time : **3 Hours** Maximum Mark:**75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer Any **TEN** Questions from the following

1. What is renewable energy?
2. Write the any two obstacles to the Implementation of renewable energy sources.
3. What is tidal power?
4. What is marine energy?
5. Name few countries that produce the most wind energy most used.
6. Why there are 3 blades on wind a wind turbine?
7. What is the origin of biomass energy?
8. What is bio gas?
9. Mention any two uses of solar energy.
10. How thick is a solar cell?
11. What is nuclear energy?
12. What is anaerobic digestion?

PART – B (5 X 5 = 25 Marks)

Answer Any **FIVE** Questions from the following

13. What are the conclusions on alternate energy strategies?
14. Explain about energy from the ocean.
15. List the merits and demerits of wind energy conversion systems.
16. Discuss about wet and dry process.
17. Discuss the working principle of solar water heater.
18. Discuss the advantages and disadvantages of horizontal and vertical axis wind mill.
19. What are the advantages of photovoltaic solar energy conversion?

PART – C (3 X 10 = 30 Marks)

Answer Any **THREE** Questions from the following

20. Enumerate the advantages and limitation of renewable energy sources.
21. Write in detail about the basic principle of tidal power generation.
22. Describe horizontal axis and Vertical axis type aero generators.
23. Explain how energy can be produced from biomass.
24. Discuss in detail the principle, design and working of solar-cooker and solar green house.

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APRIL – 2021 SEMESTER EXAMINATIONS
IV SEMESTER – M.Sc., PHYSICS

Paper Code : **17PHE4A** Title of the paper : **Elective - Nano Science And Technology**

Date :**06.05.2021 FN** Time : **3 Hours** Maximum Mark:**75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer Any **TEN** Questions from the following

1. Define Nano technology.
2. What are Nanomaterials?
3. What are quantum dots?
4. What is Quantum confinement?
5. Define Soft lithography.
6. State Laser Ablation.
7. What is the principle of SEM?
8. Mention the application of Atomic Force Microscope.
9. What is Nano biology?
10. What is NEMS?
11. What are the unique properties of Buckyballs?
12. Define Photonic crystals.

PART – B (5 X 5 = 25 Marks)

Answer Any **FIVE** Questions from the following

13. Describe how does the physical properties of Nano phase materials differ with their bulk counterparts?
14. Mention applications of Carbon Nano Tubes.
15. What is Top down and Bottom up Nanotechnology.
16. Give the comparison of SEM Vs TEM
17. Write note on uses of Nanotechnology in space and aviation.
18. Write a note on E-beam lithography.
19. Discuss about Nano sensors and its devices.

PART – C (3 X 10 = 30 Marks)

Answer Any **THREE** Questions from the following

20. Discuss about the mechanical properties of Nano materials and chemical properties of Nano particles.
21. What are the synthesis methods available for the preparation of carnonnano tubes? Explain them.
22. Explain about the chemical synthesis of nanoparticles in liquid suspension and uses of surfactants in maintaining the nanosize.
23. With neat diagram explain the principle and working of Transmission Electron Microscope (TEM).
24. Discuss about the application of nanotechnology in biotech and pharmaceutical.

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APRIL – 2021 SEMESTER EXAMINATIONS
IV SEMESTER – M.Sc., PHYSICS

Paper Code : **17PHM4A** Title of the paper : **Condensed Matter Physics**

Date :**05.05.2021 FN** Time : **3 Hours** Maximum Mark:**75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer Any **TEN** Questions from the following

1. What is meant by structure factor?
2. Mention the steps involved in finding the Miller indices of a plane.
3. What is Brillouin zone?
4. State any two properties of phonons.
5. What is 'de Hass van Allen' effect?
6. State Wiedmann franz law.
7. How is ferrimagnetic materials differ from ferromagnetic materials?
8. State the properties of magnons?
9. What is Super conductors?
10. What are SQUIDS?
11. What are DC and AC Josephson effects?
12. What is Hall effect?

PART – B (5 X 5 = 25 Marks)

Answer Any **FIVE** Questions from the following

13. Obtain the reciprocal lattice vectors of a bcc crystal structure.
14. Explain normal and Umklapp processes in a solid.
15. How are Fermi surfaces constructed ? Explain.
16. Explain the quantum theory of paramagnetism.
17. Explain type – I and type – II Super conductors .
18. Explain any two crystal structures with their features.
19. Write notes on Tunneling and Josephson effect.

PART – C (3 X 10 = 30 Marks)

Answer Any **THREE** Questions from the following

20. What is a reciprocal lattice? How is it constructed? Explain the relations between a, b, c and a*, b*, c*. List the properties of reciprocal lattice.
21. Explain Debye theory of lattice heat capacity.
22. Explain the sommer fields quantum theory with regard to the behavior of free electron gas in three dimensional box.
23. Elaborate the theory of antiferromagnetism at below and above Neel temperatures, based on the molecular theory.
24. Discuss the BCS theory of super conductivity.

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APRIL – 2021 SEMESTER EXAMINATIONS
II SEMESTER – M.Sc., PHYSICS

Paper Code : **20PHE2A** Title of the paper : **Microprocessor & Microcontroller**

Date :**26.06.2021 FN** Time : **3 Hours** Maximum Mark:**75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer Any **TEN** Questions from the following

1. What is microprocessor? Give the power supply and clock frequency of 8085.
2. How many hardware interrupts 8085 supports? Name them.
3. What are the functional parts of 8086 CPU?
4. Give the different segment registers.
5. To interface an A/D converter with the microprocessor, what does the microprocessor do?
6. What is the purpose of 8255 PPI?
7. What is the importance of special function registers (SPF) in 8051?
8. List the features of 8051 microcontroller?
9. What are the addressing modes of 8051 microcontroller?
10. Write a program to subtract two 8-bit numbers & exchange the digits using 8051?
11. What is the use of HLDA signal in 8086?
12. What are the advantages of microcontroller over microprocessor?

PART – B (5 X 5 = 25 Marks)

Answer Any **FIVE** Questions from the following

13. Explain machine cycle of 8085.
14. What do you mean by pipelined architecture? How is it implemented in 8086?
15. Explain shortly EPROM and EEPROM.
16. Explain program memory map of 8051 Micro-controller with Diagram.
17. List out the addressing modes of 8051 and explain any two of it.
18. Write an 8085 assembly language program to add two 8 bit numbers stored in memory location 2050 h and 2051 h. Store result in location 2052 h.
19. List and explain the logical group of instructions of 8051 microcontroller.

PART – C (3 X 10 = 30 Marks)

Answer Any **THREE** Questions from the following

20. Name the different addressing modes supported by 8085 instruction set and explain each one with the help of suitable examples.
21. Explain the architecture of 8086 with a neat block diagram.
22. Describe open loop control and closed loop control system with example.
23. Discuss about the interrupt structure of 8051 microcontroller in detail.
24. List and explain the arithmetic group instructions of 8051 microcontroller.

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APRIL – 2021 SEMESTER EXAMINATIONS
II SEMESTER – M.Sc., PHYSICS

Paper Code : **20PHM2A** Title of the paper : **Electromagnetic Theory**

Date :**23.06.2021 FN** Time : **3 Hours** Maximum Mark:**75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer Any **TEN** Questions from the following

1. Show that $curl\vec{E} = 0$.
2. How does polarization, ***P*** relates to the dielectric constant **ε**?
3. Give the requirements for a substance to be dielectric materials.
4. Write down the differential form of Maxwell's equations.
5. Explain the conservation of energy of electromagnetic field.
6. Discuss the significance of poynting vector.
7. State the principle of antenna arrays.
8. The radiation resistance of a dipole antenna is 7.9 Ω. What will be the antenna efficiency if the loss resistance of the dipole is 1 Ω.
9. Distinguish between linear and circular polarization.
10. State Kerr effect.
11. Write down the Lorentz transformation of electric and magnetic field.
12. Why the charge density is Lorentz invariant.

PART – B (5 X 5 = 25 Marks)

Answer Any **FIVE** Questions from the following

13. Obtain Laplace's equation. Find the solution of Laplace's equation in three dimension.
14. On account of local field effect explain the Clausius-Mossotti relationship in dielectric materials.
15. Discuss Coulomb and Lorentz gauges in detail.
16. Starting from Maxwell's equation arrive the Plane wave equation for **E** and **B**.
17. Explain Poynting's theorem and hence to deduce Poynting vector.
18. Discuss the propagation of plane waves in a conducting media.
19. Deduce the Lorentz invariance of electromagnetic equation.

PART – C (3 X 10 = 30 Marks)

Answer Any **THREE** Questions from the following

20. A grounded conducting sphere of radius *a* is placed in a uniform electric field $\boldsymbol{E_0}$ with its center at the origin. Find the potential and induced charge density at an external point using spherical harmonics.
21. Discuss energy and momentum in an electromagnetic field. Show that the momentum density vector, $\boldsymbol{g} = \mu\epsilon[\boldsymbol{E} \times \boldsymbol{H}]$.
22. Explain the linear antenna and deduce an expression for the total power radiated by a half-wave antenna.
23. Give the necessary theory on reflection and refraction of electromagnetic waves at a plane interface between dielectrics.
24. Describe four Tensor Version of Maxwell's Equations.

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APRIL – 2021 SEMESTER EXAMINATIONS
II SEMESTER – M.Sc., PHYSICS

Paper Code : **20PHM2B** Title of the paper : **Mathematical Physics - II**

Date :**24.06.2021 FN** Time : **3 Hours** Maximum Mark:**75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer Any **TEN** Questions from the following

1. Define order of a differential equation.
2. Write Rodrigue's formula.
3. What is Green's function?
4. Explain the wave equation.
5. Define Fourier transforms.
6. State Modulation theorem.
7. Write the equation of Mellin transform.
8. State the linearity property of Laplace transforms.
9. State the Weierstrass form of gamma function.
10. Define Dirac delta function.
11. Give the equation for fourier sine transforms.
12. Find L{sinkt}.

PART – B (5 X 5 = 25 Marks)

Answer Any **FIVE** Questions from the following

13. Discuss about the orthogonal properties of Laguerre's polynomial.
14. Derive qualitative idea of Green's functions in three dimensional case.
15. Discuss the properties of Fourier transforms.
16. Discuss the properties of inverse Laplace transform.
17. Explain delta sequences for one dimensional function.
18. Derive recurrence formulae for Hermite polynomials.
19. Discuss about the relationship between beta and gamma function.

PART – C (3 X 10 = 30 Marks)

Answer Any **THREE** Questions from the following

20. Deduce Bessel's differential equation and explain its generating functions.
21. Derive the solution of Laplace's equation in spherical coordinates.
22. Deduce Fourier transform of periodic functions like square wave and triangular wave.
23. Explain Laplace transforms of (i) derivative function (ii) Dirac delta function.
24. Discuss about the orthogonal function and integral representation of delta function.

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APRIL – 2021 SEMESTER EXAMINATIONS
II SEMESTER – M.Sc., PHYSICS

Paper Code : **20PHM2C** Title of the paper : **Quantum Mechanics II**

Date :**25.06.2021 FN** Time : **3 Hours** Maximum Mark:**75 Marks**

PART – A (10 X 2 = 20 Marks)

Answer Any **TEN** Questions from the following

1. State optical theorem.
2. Define total scattering cross section.
3. What do you understand by time dependent perturbation theory?
4. What is meant by magnetic resonance?
5. Define perturbation.
6. What are antiparticles?
7. Give the energy values in a coulomb potential.
8. Define trace of a matrix.
9. Define second quantization.
10. What is a field?
11. Give the concept of quantum field theory.
12. State selection rules for dipole Radiation.

PART – B (5 X 5 = 25 Marks)

Answer Any **FIVE** Questions from the following

13. Discuss transformation from centre of mass to laboratory frame of coordinates.
14. Describe adiabatic approximation.
15. Explain how negative energy state of electron leads to the theory of positron.
16. Discuss the properties of gamma matrices.
17. Discuss Quantization of Schrodinger's field.
18. Obtain the Fermi-Golden rule for constant perturbation.
19. Discuss about invariance of Dirac equation under Lorentz Transformation.

PART – C (3 X 10 = 30 Marks)

Answer Any **THREE** Questions from the following

20. Explain in detail Born approximation. Discuss the condition for the validity of born approximation.
21. Describe the semi classical theory of radiation and determine the conditions for allowed transition using it.
22. Describe how spin of an electron is obtained in Dirac's relativistic theory.
23. Discuss the covariance formulation of Dirac equation.
24. Discuss the second quantization of electromagnetic field with creation and annihilation operators.

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