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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **14PH2006 / 17PH2001** | **Duration** | **3hrs** |
| **Course Name** | **MECHANICS AND PROPERTIES OF MATTER** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Derive an expression for Newton’s laws from Kepler’s laws. | CO1 | R | 10 |
|  | b. | Demonstrate the potential and field intensity due to a solid ring at a point inside the sphere and outside the sphere. | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Give the statement for universal law of gravitation and derive the theory of relativity. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 3. |  | Estimate the range of projectile on an inclined plane. | CO1 | E | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Illustrate collisions in one dimensional and two dimensional approach and derive its expressions. | CO2 | A | 20 |
|  |  |  |  |  |  |
| 5. | a. | Explain Hooke’s law with stress-strain diagram. | CO3 | C | 15 |
|  | b. | Determine the strain for a cord that has original length of 100 cm pulled by a force. The change in length of the cord is 2 mm. | CO4 | E | 5 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Illustrate the torsional pendulum and derive an expression for couple per unit twist in a cylindrical wire. | CO5 | U | 8 |
|  | b. | Evaluate an expression for work done in twisting a wire. | CO4 | E | 12 |
|  |  |  |  |  |  |
| 7. |  | Explain the bending of beams experiment to determine the Young’s modulus of a rectangular bar using non-uniform bending. | CO4 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Explain the theory and experiment to determine the Young’s modulus of a cylindrical scale by cantilever depression method. | CO5 | A | 20 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Summarize surface tension experiment and explain its theory of expression. | CO6 | E | 10 |
|  | b. | State Bernoulli’s theorem and explain one of its important applications. | CO6 | C | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Gain knowledge and understand concepts related to mechanics and properties of matter. |
| CO2 | Understand earth’s gravitation, elasticity of materials, and mechanics of fluids. |
| CO3 | Solve problems related to mechanics and properties of matter. |
| CO4 | Differentiate between types of modulus and find its applications. |
| CO5 | Apply the knowledge of properties of matter in solving problems associated with mechanics. |
| CO6 | Appreciate the role of inertia in determining the properties of matter. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 10 |  | 10 |  | 20 |  | 40 |
| CO2 |  | 20 | 20 |  |  |  | 40 |
| CO3 |  |  |  |  |  | 15 | 15 |
| CO4 |  |  |  | 20 | 17 |  | 37 |
| CO5 |  | 8 | 20 |  |  |  | 28 |
| CO6 |  |  |  |  | 10 | 10 | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **14PH2008 / 17PH2015** | **Duration** | **3hrs** |
| **Course Name** | **ELECTRICITY AND MAGNETISM** | **Max. Marks** | **100** |

**ANSWER ALL QUESTIONS (5 X 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **CO / BL** | **M** |
| 1. | a. | State electric field and electric forces. | CO1 / R | 5 |
|  | b. | State and prove Gauss’s law in electrostatics. Apply Gauss’s law to find the electric field due to a line of charge of infinite length. | CO1 / A | 15 |
| **(OR)** | | | | |
| 2. | a. | Electric flux inside the good conductor is zero. Justify the statement. | CO2 /An | 5 |
|  | b. | Prove that the electric field due to an infinite sheet of charge is σ/2ε0 by using Gauss’s law. | CO1 / A | 15 |
|  |  |  |  |  |
| 3. | a. | Define electric current and current density. | CO5 / R | 5 |
|  | b. | Deduce an expression for the electric potential at (i) an external point (ii) an internal point, due to uniformly charged non-conducting solid sphere. | CO5 / A | 15 |
| **(OR)** | | | | |
| 4. | a. | State and prove Ohm’s law. | CO5 / U | 5 |
|  | b. | Obtain an expression for the resistors in series and parallel connection. | CO5 / U | 15 |
|  |  |  |  |  |
| 5. | a. | Define Biot-Savart’s law and Faraday’s law of magnetic field. | CO6 / U | 5 |
|  | b. | Derive an expression for magnetic field of current carrying conductor. | CO6 / A | 15 |
| **(OR)** | | | | |
| 6. | a. | Explain the Ampere’s law. | CO4 / R | 5 |
|  | b. | Illustrate the force between parallel conductors. | CO3 / A | 15 |
|  |  |  |  |  |
| 7. | a. | Discuss about displacement current. | CO3 / U | 5 |
|  | b. | Derive Maxwell’s equation and explain the relation between electric and magnetic fields. | CO4 /An | 15 |
| **(OR)** | | | | |
| 8. | a. | Define electromagnetism. | CO3 / U | 5 |
|  | b. | Find the Maxwell’s expression for free space. | CO4 / A | 15 |
|  | | **COMPULSORY** |  |  |
| 9. |  | Elucidate electromagnetic induction. Applying that explain the working of dynamo in detail. | CO6 / A | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Ability to solve the problems in different EM fields |
| CO2 | Ability to design a programming to generate EM waves subjected to the conditions |
| CO3 | Applications of EM Waves in different domains |
| CO4 | Ability to Solve Electromagnetic Relation using Maxwell Formulae |
| CO5 | Ability to Solve Electro Static and Magnetic to Static circuits using Basic relations |
| CO6 | Ability to analyze moving charges on Magnetic fields |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 5 | - | 30 | - | - | - | 35 |
| CO2 | - | - | - | 5 | - | - | 5 |
| CO3 | - | 10 | 15 | - | - | - | 25 |
| CO4 | 5 | - | 15 | 15 |  |  | 35 |
| CO5 | 5 | 20 | 15 | - | - | - | 40 |
| CO6 | - | 5 | 35 | - | - | - | 40 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **14PH2010 / 17PH2012** | **Duration** | **3hrs** |
| **Course Name** | **VACUUM AND THIN FILM TECHNOLOGY** | **Max. Marks** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **CO** | **BL** | **M** |
| 1. | a. | Recall the dependence of gas viscosity on temperature. | CO1 | R | 1 |
|  | b. | The distance covered by a particle between successive collisions is called \_\_\_\_\_\_\_. | CO1 | R | 1 |
|  | c. | Define Knudsen number. | CO1 | R | 2 |
|  | d. | Define thermal accommodation coefficient. | CO1 | R | 2 |
|  | e. | Explain the geometry of molecular impingement flux with a suitable sketch and derive the equation to determine the molecular impingement flux. | CO1 | U&A | 14 |
|  | | **(OR)** | | | |
| 2. | a. | Recall the clean form of pumping. | CO2 | R | 1 |
|  | b. | The inner surface of cryopump assists in pumping hydrogen by \_\_\_\_\_\_. | CO2 | U | 1 |
|  | c. | Explain the significance of vacuum in thin film technology. | CO1 | U | 2 |
|  | d. | Define mean free path. | CO1 | R | 2 |
|  | e. | Derive the equation to calculate the mean free path of electron, molecular ion, and molecule-molecule collisions. | CO1 | A | 14 |
|  |  |  |  |  |  |
| 3. | a. | \_\_\_\_\_\_\_\_\_\_\_ pump is based on the principle of displacement of gap. | CO2 | R | 1 |
|  | b. | \_\_\_\_\_\_\_\_\_\_\_ vacuum pump traps gases and vapors by condensing them on a cold surface. | CO2 | R | 1 |
|  | c. | Mention the principle of working of rotary pump. | CO2 | R | 2 |
|  | d. | Recall the drawbacks of diffusion pump. | CO2 | U | 2 |
|  | e. | With a neat sketch explain the construction and working of diffusion pump. | CO2 | U | 14 |
|  | | **(OR)** | | | |
| 4. | a. | \_\_\_\_\_\_\_\_\_\_\_ pumps use no oil and operates like jet engines. | CO2 | R | 1 |
|  | b. | \_\_\_\_\_\_\_\_\_\_\_ is a device that reduces the pressure of gas in a container. | CO2 | R | 1 |
|  | c. | Mention the principle of working of cryopump. | CO2 | U | 2 |
|  | d. | Describe the construction of rotary pump. | CO2 | R | 2 |
|  | e. | Explain with suitable diagram the principle, instrumentation and operation turbo molecular of pump. | CO2 | U | 14 |
|  |  |  |  |  |  |
| 5. | a. | \_\_\_\_\_\_\_\_ gauges report pressure by measuring a pressure-dependent property of the gas. | CO3 | R | 1 |
|  | b. | \_\_\_\_\_\_\_ acts as pressure sensitive element in diaphragm vacuum gauge. | CO3 | R | 1 |
|  | c. | Distinguish between pirani and penning gauge. | CO3 | U | 2 |
|  | d. | Describe the construction of Bourdon gauge. | CO3 | R | 2 |
|  | e. | With a neat sketch describe the construction and working principle of penning gauge. Mention its advantages and disadvantages. | CO3 | U | 14 |
|  | | **(OR)** | | | |
| 6. | a. | \_\_\_\_\_\_\_\_\_\_\_ gauge is also called ionization gauge. | CO3 | R | 1 |
|  | b. | \_\_\_\_\_\_\_\_\_\_\_ gauges incorporate the principle of energy transfer between a hot wire and a room temperature gauge wall. | CO3 | R | 1 |
|  | c. | Differentiate the different pressure flow regimes with respect to Knudsen number. | CO3 | U | 2 |
|  | d. | Differentiate direct reading gauges and indirect reading gauges. | CO3 | U | 2 |
|  | e. | With suitable sketch, explain in detail, the construction and working of Capacitance Diaphragm gauge. | CO3 | U | 14 |
|  |  |  |  |  |  |
| 7. | a. | \_\_\_\_\_\_\_\_ is a multi-component system where the constitutive elements are completely miscible in each other and can have varying stoichiometry. | CO4 | U | 1 |
|  | b. | The evaporation boat is made up of \_\_\_\_\_\_\_\_\_ material. | CO4 | R | 1 |
|  | c. | Compare wire basket and dimple boat source. | CO4 | U | 2 |
|  | d. | List the different source of impurities in physical vapour deposition process. | CO4 | R | 2 |
|  | e. | Explain in detail the different steps in the growth of thin films. | CO4 | U | 14 |
|  | | **(OR)** | | | |
| 8. | a. | The type of adsorption due to weak van der waals force is called \_\_\_\_\_\_\_\_\_\_\_. | CO5 | R | 1 |
|  | b. | Magnetic materials cannot be deposited using \_\_\_\_\_\_\_ sputtering process. | CO5 | U | 1 |
|  | c. | Define interface. | CO5 | R | 2 |
|  | d. | Describe the process of sputtering. | CO5 | U | 2 |
|  | e. | Describe the process of chemical vapor deposition with a suitable sketch and mention its advantages. | CO5 | U | 14 |
|  | | **Compulsory**: |  |  |  |
| 9. | a. | The gel is a \_\_\_\_\_\_\_mass. | CO6 | R | 1 |
|  | b. | The basic principle involved in spray pyrolysis technique is \_\_\_\_\_\_\_\_decomposition of salts of a desired compound to be deposited. | CO6 | R | 1 |
|  | c. | Define spray pyrolysis. | CO6 | U | 2 |
|  | d. | Differentiate DC and RF sputtering. | CO6 | U | 2 |
|  | e. | Draw the schematic of RF sputtering, explain its working principle in the deposition of ZnO thin films and mention its advantages. | CO6 | A | 14 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the importance of various vacuum pumps in thin film technology |
| CO2 | Appreciate the measurement of vacuum using suitable pressure gauges |
| CO3 | Identify the physical and chemical methods of thin film deposition |
| CO4 | Compare the vacuum and non-vacuum techniques for thin film deposition |
| CO5 | Understand the process of thin film growth |
| CO6 | Apply the properties of thin film coatings for various applications |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO /BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 8 | 9 | 21 | - | - | - | 38 |
| CO2 | 9 | 33 | - | - | - | - | 42 |
| CO3 | 6 | 34 | - | - | - | - | 40 |
| CO4 | 3 | 17 | - | - | - | - | 20 |
| CO5 | 3 | 17 |  | - | - | - | 20 |
| CO6 | 2 | 4 | 14 | - | - | - | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **14PH2019 / 17PH2013** | **Duration** | **3hrs** |
| **Course Name** | **CONDENSED MATTER PHYSICS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Define effective mass of electrons and explain the concept of hole. | CO1 | U | 5 |
|  | b. | Derive the expression for electrical conductivity of conductors. | CO1 | U | 15 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Distinguish dielectric materials and insulators with suitable examples. | CO4 | U | 5 |
|  | b. | With a neat sketch explain the band theory of solids. | CO1 | U | 15 |
|  |  |  |  |  |  |
| 3. | a. | With a neat sketch explain direct and indirect band gap semiconductors with suitable examples. | CO2 | U | 5 |
|  | b. | Explain the internal field or local field in liquids and solids with suitable sketch. | CO4 | U | 15 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Mention the Fermi-Dirac distribution function f(E) and define all the symbols in the relation. | CO5 | R | 5 |
|  | b. | Explain the temperature dependence of magnetism and ferromagnetism in detail. | CO6 | U | 15 |
|  |  |  |  |  |  |
| 5. | a. | Differentiate type I and type II superconductors. | CO3 | U | 5 |
|  | b. | Differentiate the properties of Para, ferro and antiferro magnetic materials with adequate diagram. | CO6 | U | 15 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the concept of Bloch wall with a neat sketch. | CO6 | R | 5 |
|  | b. | Derive the expression for Clausius Mossotti equation. | CO5 | U | 15 |
|  |  |  |  |  |  |
| 7. | a. | List the different types of crystal defects. Explain line defect and point defects and its underlying principle with adequate diagram in detail. | CO2 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe Barkhausen effect in detail. | CO3 | R | 5 |
|  | b. | Explain Hall effect with a suitable sketch and list its applications. | CO4 | U | 15 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Derive the equation for net magnetization using quantum theory of magnetism. | CO6 | U | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the band theory of solids |
| CO2 | Interpret the different types of semiconductors |
| CO3 | Define and explain the properties of superconductors |
| CO4 | Gain knowledge on dielectrics |
| CO5 | Appreciate the properties of ferroelectrics |
| CO6 | Explain the different types of magnetic materials |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 35 | - |  |  |  | 35 |
| CO2 | - | 25 | - |  |  |  | 25 |
| CO3 | 5 | 05 | - |  |  |  | 10 |
| CO4 | - | 35 | - |  |  |  | 35 |
| CO5 | 5 | 15 | - |  |  |  | 20 |
| CO6 | 5 | 50 |  |  |  |  | 55 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **16NT3002 / 17NT3002** | **Duration** | **3hrs** |
| **Course Name** | **NANOELECTRONICS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Demonstrate the working of Enhancement MOSFET with volt -ampere characteristics and the schematic of E-MOSFET. | CO1 | U | 15 |
|  | b. | Draw the transfer characteristics of E-MOSFET. | CO1 | U | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Compare Depletion type and enhancement type MOSFET with IV and Trans conductance graphs. | CO2 | An | 20 |
|  |  |  |  |  |  |
| 3. | a. | Illustrate the Gate all around MOSFET with suitable schematic. | CO3 | A | 10 |
|  | b. | Appraise the quantum cellular automata in designing logic operations with Q Dots. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Analyze the effects of short channel field effect transistor with IV characteristics. | CO4 | An | 20 |
|  |  |  |  |  |  |
| 5. | a. | Describe the principles of CMOS Technology with suitable schematic and explain the investor CMOS. | CO4 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Demonstrate the quantum cellular automata with sample logical operations. | CO5 | An | 20 |
|  |  |  |  |  |  |
| 7. | a. | Draw the band structure for forward and reverse bias characteristics in Tunnel Diode and explain the negative resistance region of its IV plot. | CO5 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Compare the working of field effect transistor and the single electron transistor | CO6 | An | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Demonstrate the working of CNT FET with the schematic. | CO6 | A | 12 |
|  | b. | Appraise the miniaturization of micro electro mechanical systems (MEMS) with its applications | CO6 | An | 8 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Relate the transistor scaling and its limits |
| CO2 | Infer about the short channel transistors and its limits |
| CO3 | Analyze the various split gate transistor structures |
| CO4 | Model the CMOS transistors for the various circuits |
| CO5 | Utilize the Tunneling devices for high frequency applications |
| CO6 | Design of computing model of Nanostructured Devices |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  | 20 |  |  |  |  | 20 |
| CO2 |  |  |  | 20 |  |  | 20 |
| CO3 |  |  | 10 | 10 |  |  | 20 |
| CO4 |  | 20 |  | 20 |  |  | 40 |
| CO5 |  |  |  | 40 |  |  | 40 |
| CO6 |  |  | 12 | 28 |  |  | 40 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **16PH2004 / 17PH2007** | **Duration** | **3hrs** |
| **Course Name** | **SEMICONDUCTOR LOGIC DEVICES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | Develop the half and full adder logical circuit using the Karnaugh map. | CO3 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Develop the half and full subtractor logical circuit using the Karnaugh map. | CO3 | A | 20 |
|  |  |  |  |  |  |
| 3. |  | Explain the multiplexers and de-multiplexers logic circuit with its logic table. | CO4 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Develop the encoder and decoder logic circuit for the digital communication. | CO4 | A | 20 |
|  |  |  |  |  |  |
| 5. |  | Develop the Boolean expression using Karnaugh map and design the logic circuit.  f (A,B,C,D)= Σ (2,3,6,12,15) | CO2 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Explain the Set-Reset (SR) flip flop sequential logic circuit with its logical table. | CO5 | A | 20 |
|  |  |  |  |  |  |
| 7. |  | Discuss in detail the different types of shift registers with a neat diagram. | CO6 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Explain the 4 bit adder circuit using carry look ahead by carry generation and carry propagate expressions. | CO3 | A | 20 |
| **PART – B(1 X 20= 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. |  | Summarize the symbol, pin diagram and truth table of the various logic gates. | CO1 | U | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Define about basics of digital electronics. |
| CO2 | Build the digital circuit design. |
| CO3 | Develop the combinational circuits. |
| CO4 | Design the digital communication circuits. |
| CO5 | Identify about the various flip flop. |
| CO6 | Construct synchronous and Asynchronous circuits. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | - | 20 | - | - | - | - | 20 |
| CO2 | - | - | 20 | - | - | - | 20 |
| CO3 | - | - | 60 | - | - | - | 60 |
| CO4 | - | - | 40 | - | - | - | 40 |
| CO5 | - | - | 20 | - | - | - | 20 |
| CO6 | - | 20 | - | - | - | - | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **16PH2008/17PH2010** | **Duration** | **3hrs** |
| **Course Name** | **PHYSICS OF LINEAR INTEGRATED CIRCUITS & VLSI DESIGN** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | Develop the inverter summing amplifier circuit using operational amplifier and derive the output voltage (Vout). | CO2 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Develop the non-inverting adder circuit using operational amplifier and derive the output voltage (Vout). | CO3 | A | 20 |
|  |  |  |  |  |  |
| 3. |  | Illustrate the various steps involved in CMOS fabrication with neat diagram. | CO5 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Explain the Silicon On Insulator (SOI) technology with neat diagram. | CO6 | A | 20 |
|  |  |  |  |  |  |
| 5. |  | Discuss the hardware description language in VLSI design. | CO4 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Explain the inverting and non-inverting operational amplifier with neat diagram. | CO1 | A | 20 |
|  |  |  |  |  |  |
| 7. |  | Explain in detail the importance of stick diagram and also draw the stick diagram of CMOS inverter. | CO5 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Discuss the field programmable gate arrays with neat diagram. | CO6 | U | 20 |
| **PART – B(1 X 20= 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. |  | Explain in detail the full custom design and semi-custom design of VLSI technology. | CO2 | A | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Identify the Theoretical analysis of Operational amplifier. |
| CO2 | Infer about the OP-Amp IC 741 and its analysis. |
| CO3 | Develop the Various applications of IC 741. |
| CO4 | Infer Basics of VLSI Design and analysis. |
| CO5 | Build CMOS inverter circuit for various design. |
| CO6 | Construct the Design process of VLSI. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | - | - | 20 | - | - | - | 20 |
| CO2 | - | - | 40 | - | - | - | 40 |
| CO3 | - | - | 20 | - | - | - | 20 |
| CO4 | - | 20 | - | - | - | - | 20 |
| CO5 | - | 20 | - | 20 | - | - | 40 |
| CO6 | - | 20 | 20 | - | - | - | 40 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **17N3005** | **Duration** | **3hrs** |
| **Course Name** | **FUNCTIONALIZATION OF NANOSTRUCTURES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | What are carbon dots? What are the functional groups present on their surface? Describe the methods of modification of amino groups on carbon dots. | CO1 | U | 10 |
|  | b. | What are the types of carbon nanotubes? What are the common functional groups attached on carbon nanotubes? Discuss the functionalization methods of carbon nanotubes. | CO1 | U | 10 |
| **(OR)** | | | | | |
| 2. |  | What is the type of bon formed between thiol groups and gold nanoparticle surface? Explain the surface modification of gold nanoparticles by functional group attachment. | CO2 | R | 20 |
|  | | | | | |
| 3. |  | Explain Diels-Alder and Bingel reactions in the functionalization of graphene oxides. | CO2 | R | 20 |
| **(OR)** | | | | | |
| 4. |  | What are magnetic nanoparticles? What are the types of iron oxides based on stoichiometry? Explain the functionalization of iron oxide nanoparticles with suitable examples. | CO3 | R | 20 |
|  | | | | | |
| 5. |  | Explain the stability of magnetic nanoparticles and ligand modification of them. | CO3 | An | 10 |
| **(OR)** | | | | | |
| 6. |  | What are the methods of synthesis of silicon dioxide nanoparticles? Explain their biocompatibility and applications. | CO4 | A | 20 |
|  |  |  | |  |  |
| 7. |  | Discuss the applications of magnetic nanoparticles in drug delivery. | CO4 | An | 20 |
|  |  | **(OR)** | |  |  |
| 8. |  | Explain the applications of quantum dots in diagnosis and treatment  of chronic diseases. | CO5 | A | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Elaborate the functionalization methods and biomedical applications of semiconductor quantum dots. | CO6 | U | 20 |

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|  | **COURSE OUTCOMES** |
| CO1 | Demonstrate the mechanism of functionalization |
| CO2 | Infer the metal oxide, organic functionalization in carbon nanomaterials |
| CO3 | To solve problems on functionalization methods. |
| CO4 | To choose reagents for deriving functional groups on nanomaterials. |
| CO5 | To envisage the tailoring of properties of nanomaterials based on functionalization. |
| CO6 | To understand recent newer developments in functionalized nanomaterials for plausible new devices |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | - | 20 | - | - | - | - | 20 |
| CO2 | 40 | - | - | - | - | - | 40 |
| CO3 | 20 | - | - | 10 | - | - | 30 |
| CO4 | - | - | 20 | 20 | - | - | 40 |
| CO5 | - | - | 20 | - | - | - | 20 |
| CO6 | 20 | - | - | - | - | - | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **16NT3006 / 17NT3006** | **Duration** | **3hrs** |
| **Course Name** | **NANO SAFETY AND ENVIRONMENTAL ISSUES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe application of nanomaterial in four areas. | CO1 | R | 8 |
|  | b. | Analyse the hazardous effect of nanomaterials on human health. | CO1 | U | 12 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Identify ten areas and explain why intensive research is needed in those area? | CO1 | U | 20 |
|  |  |  |  |  |  |
| 3. | a. | Analyse the various aspects associated with risk assessment of ENMs. | CO2 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Discus the effect of SWCNT on the pulmonary track. | CO2 | U | 10 |
|  | b. | Analyse the effect of inhalation and deposition of nanoparticles on human. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Illustrate the ways by which the inhaled nanomaterial is cleared from the lungs. | CO3 | R | 15 |
|  | b. | Write the five distinct mechanisms concerning the deposition of solid materials. | CO3 | U | 05 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Analyse the occurrence of inhaled solid material in the lungs through their bio-persistence. | CO3 | A | 10 |
|  | b. | Review the systemic translocation of inhaled nanoparticles. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | What are the various eco-toxicological tests and explain how they are able to ascertain the toxicity of a material. | CO4 | R | 15 |
|  | b. | Identify three terms which are used in ecotoxicological tests and explain them. | CO4 | U | 05 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the ecotoxicity measurement used for polychlorinated biphenyls. | CO4 | R | 15 |
|  | b. | What is the end point classification in ecotoxicological tests and explain? | CO4 | U | 05 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | How under and over regulations impact the nanosafety procedures? | CO5 | R | 05 |
|  | b. | Analyse the FDA regulation on nano-safety and environmental issues. | CO6 | U | 15 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Relate the toxic effects of nanotechnology on human health. |
| CO2 | Analyse the various issues on environmental effects. |
| CO3 | Identify suitable remedial measures. |
| CO4 | Suggest start-of-the-pipe solution for environmental issues based on nanomaterials. |
| CO5 | Workout problems on nanomaterials related to toxicity. |
| CO6 | To frame a model policy on preventing health hazards. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 08 | 32 |  |  |  |  | 40 |
| CO2 | 20 | 10 | 10 |  |  |  | 40 |
| CO3 | 15 | 15 | 10 |  |  |  | 40 |
| CO4 | 30 | 10 |  |  |  |  | 40 |
| CO5 | 05 |  |  |  |  |  | 05 |
| CO6 |  | 15 |  |  |  |  | 15 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **17NT3019** | **Duration** | **3hrs** |
| **Course Name** | **SYNTHESIS AND APPLICATIONS OF NANOMATERIALS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Mention the difference between 0D, 1D and 2D nanomaterials with suitable examples. | CO1 | R | 4 |
|  | b. | Distinguish between top-down and bottom-up approach in the synthesis of nanomaterials with suitable examples. | CO1 | An | 16 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define Arc plasma. | CO1 | R | 5 |
|  | b. | Describe the process of laser ablation in the preparation of nanomaterials with an example. | CO1 | U | 15 |
|  |  |  |  |  |  |
| 3. | a. | Explain the steps involved in sol-gel synthesis of nanomaterials with a neat sketch. | CO3 | U | 15 |
|  | b. | List the advantages and application of solgel synthesis. | CO3 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Write a short note on self-assembly process. | CO3 | R | 5 |
|  | b. | Discuss the different steps in templated synthesis of nanomaterials with suitable examples. | CO3 | U | 15 |
|  |  |  |  |  |  |
| 5. | a. | List the physical deposition methods. | CO5 | R | 5 |
|  | b. | Describe the function of each component in molecular beam epitaxial unit with a neat sketch and discuss its working principle. | CO5 | U | 15 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the working concept of Pulsed Laser Deposition process mentioning the different steps involved in the process. | CO5 | U | 15 |
|  | b. | Discuss the advantages and disadvantages of PLD. | CO5 | U | 5 |
|  |  |  |  |  |  |
| 7. | a. | Classify Graphite, Graphene Oxide and Graphene. | CO2 | An | 4 |
|  | b. | Describe the modified hummer’s method and pyrolysis process of making graphene. | CO4 | U | 16 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Define Core Shell and its uses. | CO2 | R | 2 |
|  | b. | Describe the methods of preparation of ordered mesoporous structures with suitable examples. | CO4 | U | 18 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Write the biological applications of nanomaterials. | CO6 | R | 5 |
|  | b. | Explain molecular electronics and nanoelectronics with suitable examples and mention its advantages. | CO6 | U | 15 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Demonstrate knowledge on various types of nanomaterials |
| CO2 | Choose the different physical methods in preparing nanomaterials |
| CO3 | Utilize the different chemical methods in preparing nanomaterials |
| CO4 | Select the suitable methods for synthesis of different nanomaterials |
| CO5 | Experiment the different technique for nanomaterial coatings |
| CO6 | Appraise the advanced techniques like lithography |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 9 | 15 |  | 16 |  |  | 40 |
| CO2 | 2 |  |  | 4 |  |  | 6 |
| CO3 | 10 | 30 |  |  |  |  | 40 |
| CO4 |  | 34 |  |  |  |  | 34 |
| CO5 | 5 | 35 |  |  |  |  | 40 |
| CO6 | 5 | 15 |  |  |  |  | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **17NT3039** | **Duration** | **3hrs** |
| **Course Name** | **SEMICONDUCTOR NANOSTRUCTURES AND NANO-PARTICLES** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe the properties of Two dimensional Semiconductor Nanostructures. | CO1 | U | 14 |
|  | b. | Illustrate the Density of states functions for 2D electron system as a function of energy. | CO1 | R | 6 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Evaluate the Finite potential square well, and the first three Energy levels and wave functions. | CO2 | An | 15 |
|  | b. | Draw the Harmonic oscillator potential well and Triangular, potential well. | CO2 | A | 5 |
|  |  |  |  |  |  |
| 3. | a. | Demonstrate the Molecular Bream Epitaxial Method of preparing Nano material with a neat schematic. | CO3 | U | 15 |
|  | b. | Justify the role of effusion cells in depositing multiple layers of materials. | CO3 | An | 5 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Apply spray pyrolysis method for depositing metal oxide nano films and explain the effect of process parameters and the thickness of the films. | CO3 | A | 16 |
|  | b. | Compare the physical and chemical methods of nanomaterials synthesis in terms of the semiconductor device Applications. | CO3 | A | 4 |
|  |  |  |  |  |  |
| 5. | a. | List out the physical properties that alters due to size reduction to nanoscale. | CO4 | R | 10 |
|  | b. | Differentiate the band structure of different quantum states with suitable schematic. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Evaluate the surface to volume ratio for bulk and nanostructure. | CO4 | E | 8 |
|  | b. | Classify the quantum structures when size reduction of bulk to one dimensional, 2D and 3D. | CO4 | R | 12 |
|  |  |  |  |  |  |
| 7. | a. | Demonstrate the quantum dot solar cell and its supremacy over bulk semiconductor using solar cell parameters. | CO5 | E | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Design a Quantum cascade structure of laser emission system. | CO5 | C | 10 |
|  | b. | Analyse the semiconductor nanomaterials that are suitable for Light Emitting Diodes. | CO5 | An | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Design a nanowire-based field effect transistor and plot the IV characteristics depicting the step potential. | CO6 | C | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

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|  | **COURSE OUTCOMES** |
| CO1 | Analyse the Semiconductor Nanostructure |
| CO2 | Demonstrate the method for nanostructure fabrication techniques |
| CO3 | Apraise the physical properties of nano materials |
| CO4 | Evaluate the parameters of nanodevices through optical and electrical characterics |
| CO5 | Analyse the nanowire based devices and the methods of fabrication |
| CO6 | Design nano devices with different quantum nanostructure |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **17PH2008 / 14PH2012** | **Duration** | **3hrs** |
| **Course Name** | **SPECTROSCOPY** | **Max. Marks** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **CO / BL** | **Marks** |
| 1. | a. | Define fine structure and explain it with an example. | CO1 /R | 10 |
| b. | Explain hyperfine structure with examples. | CO1/ U | 10 |
| **(OR)** | | | | |
| 2. | a. | Describe the electromagnetic regions based on their wavelength. | CO1 / R | 10 |
| b. | Compare the characteristics of light associated with its particle and wave nature. | CO1 / U | 10 |
|  |  |  |  |  |
| 3. | a. | Relate Raman scattering with Rayleigh scattering and mention its applications. | CO2 / A | 10 |
| b. | Using the particle nature of light elaborate the Raman scattering process. | CO3 / A | 10 |
| **(OR)** | | | | |
| 4. | a. | Determine the role of LASER source in Raman spectrometer and mention the characteristics of LASER light. | CO2 / A | 10 |
| b. | With a neat sketch, elaborate the LASER Raman Spectrometer. | CO3 / A | 10 |
|  |  |  |  |  |
| 5. |  | With a neat sketch explain the vibrational modes of CO2 and H2O molecules. | CO4 / An | 20 |
| **(OR)** | | | | |
| 6. |  | Outline the characteristics of a diatomic molecule and explain its vibrational energy levels as a simple harmonic oscillator. | CO4 /An | 20 |
|  |  |  |  |  |
| 7. | a. | Compare the concept of LASER and MASER. | CO5 / E | 10 |
| b. | Interpret the role of microwaves in working of MASER and its applications. | CO5 / E | 10 |
| **(OR)** | | | | |
| 8. | a. | Compare and contrast the working of NMR spectrometer with emphasis on single and double coil method. | CO5 / E | 10 |
| b. | Assess the role of pulse method in case of NMR spectrometer. | CO5 / E | 10 |
|  | | **COMPULSORY** |  |  |
| 9. |  | Interpret the role of electron spin in ESR spectrometer. | CO6 / U | 20 |

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|  | **COURSE OUTCOMES** |
| CO1 | Students can understand how spectroscopic studies in different regions of the E.M spectrum probe different types of molecular transitions |
| CO2 | When the structure of the molecule is to be interpreted, students will apply suitable spectroscopic techniques |
| CO3 | To solve the structure of molecules using theory learned from the spectroscopic techniques |
| CO4 | To appreciate the advancements in instrumentation by overcoming the drawbacks in each spectroscopic technique |
| CO5 | To compare the spectroscopic techniques based on merits and demerits |
| CO6 | To identify the best method to solve the spectroscopic problems |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 20 | 20 |  |  |  |  | 40 |
| CO2 |  |  | 20 |  |  |  | 20 |
| CO3 |  |  | 20 |  |  |  | 20 |
| CO4 |  |  |  | 40 |  |  | 40 |
| CO5 |  |  |  |  | 40 |  | 40 |
| CO6 |  | 20 |  |  |  |  | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **17PH3005** | **Duration** | **3hrs** |
| **Course Name** | **QUANTUM MECHANICS-I** | **Max. marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | How did Schrodinger represent the state vector and operators with respect to time. Discuss. | CO1 | U | 10 |
| b. | Interaction picture is the intermediate between Schrodinger and Heisenberg picture. Validate the statement. | CO1 | U | 10 |
| **(OR)** | | | | | |
| 2. | a. | Obtain the proof for the following theorems,   1. Hermitian operators have real eigen values. 2. Two eigen functions of Hermitian operators, belonging to different eigen values, are orthogonal. | CO1 | U | 10 |
| b. | Give a clear outline on the operator formalism in quantum mechanics. | CO1 | R | 10 |
|  |  |  |  |  |  |
| 3. |  | Deduce the Schrodinger time independent wave equation for a particle in a one dimensional potential well and obtain its energy and wave function. | CO2 | A | 20 |
| **(OR)** | | | | | |
| 4. |  | Find the eigen value of the one dimensional linear harmonic oscillator by obtaining and solving its wave equation. | CO3 | An | 20 |
|  |  |  |  |  |  |
| 5. |  | Prove the following,   1. [J2, Jy] = 0 2. [Jz, J-] = - (h/2π) J- 3. [J+, J-] = (h/π) Jz | CO4 | A | 20 |
| **(OR)** | | | | | |
| 6. |  | Obtain the eigen value of the following,   1. J+ and J- 2. Jx and Jy | CO4 | A | 20 |
|  |  |  |  |  |  |
| 7. |  | The first order energy correction for a perturbed non-degenerate system is the expectation value of the first order perturbed Hamiltonian over the unperturbed state. Validate. | CO5 | An | 20 |
| **(OR)** | | | | | |
| 8. |  | Outline variation method and apply it to calculate the energy of the ground state helium atom. | CO6 | A | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | How does Thomas-Fermi model explain the behavior of many electron systems? Elucidate in detail. | CO6 | U | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| CO1 | Gain an in depth understanding on the central concepts and principles of quantum mechanics: the Schrödinger equation, the wave function and its physical interpretation, stationary and non-stationary states and expectation values. |
| CO2 | Improved mathematical skills necessary to solve differential equations and eigenvalue problems using the operator formalism |
| CO3 | Quantum mechanical solution of simple systems such as the harmonic oscillator and a particle in a potential well |
| CO4 | Grasp the concepts of spin and angular momentum, as well as their quantization- and addition rules. |
| CO5 | Student forms a mental picture on the meaning of linear combination of states within quantum mechanics |
| CO6 | Solutions to perturbation problems and many electron systems |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 30 | - | - | - | - | 40 |
| CO2 | - | - | 20 | - | - | - | 20 |
| CO3 | - | - | - | 20 | - | - | 20 |
| CO4 | - | - | 40 | - | - | - | 40 |
| CO5 | - | - | - | 20 | - | - | 20 |
| CO6 | - | 20 | 20 | - | - | - | 40 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **17PH3021** | **Duration** | **3hrs** |
| **Course Name** | **MATERIAL CHARACTERIZATION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Differentiate the bright and dark field microscopy with a neat sketch and recall their application in material characterization. | CO1 | U | 16 |
|  | b. | Identify the bright field, dark field and phase contrast images.  A B C D  A close-up of a microscope  Description automatically generated | CO1 | A | 4 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the four-probe method in measurement of the sheet resistance and resistivity of a thin film sample. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 3. | a. | Illustrate the powder X-ray diffraction method in detail and explain its principle behind analyzing the structure of a given material. | CO3 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the working principle of Auger Electron Spectroscopy (AES) and describe the significance of AES energy spectrum. | CO4 | U | 15 |
|  | b. | With a neat sketch describe the role of each component in AES. | CO4 | U | 5 |
|  |  |  |  |  |  |
| 5. | a. | Describe the hall effect setup with a neat sketch and explain its role in differentiating n-type and p-type materials. | CO5 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the instrumentation of FTIR with a neat sketch and discuss its working principle, sample preparation and analysis with suitable example. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 7. | a. | Assume that you have been given a metal oxide powder sample for characterization. Mention the analysis you will perform to identify the material, its morphology, transmittance percentage, recombination effect, its purity and thermal stability. | CO2 | A | 5 |
|  | b. | Explain the instrumentation and working principle of scanning electron microscopy. Illustrate the requirements in determination of the morphology of a conducting and a non-conducting material. | CO3 | U | 15 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Discuss the working principle of UV-Visible spectrophotometer and explain its instrumentation with a neat sketch. | CO4 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Illustrate the instrumentation and working of DTA with a neat sketch. | CO6 | U | 15 |
|  | b. | List the advantages and applications of TGA. | CO6 | R | 5 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify suitable techniques for specific materials characterization. |
| CO2 | Use various instrumentations to scan and test materials for electrical, mechanical, and thermal property analysis |
| CO3 | Analyse the structural and compositional properties of materials using XRD, SEM, XPS, EDAX and AFM |
| CO4 | Apply the microscopic and macroscopic property analysis for various materials |
| CO5 | Analyse the magnetic properties of materials and functions |
| CO6 | Practice the testing of materials for various thermal property analysis. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 36 | 4 | - | - | - | 40 |
| CO2 | - | 20 | 5 | - | - | - | 25 |
| CO3 | - | 35 | - | - | - | - | 35 |
| CO4 | - | 40 | - | - | - | - | 40 |
| CO5 | - | 20 | - | - | - | - | 20 |
| CO6 | 5 | 15 | - | - | - | - | 20 |
|  | | | | | | | **180** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **18PH1009** | **Duration** | **3hrs** |
| **Course Name** | **APPLIED PHYSICS AND PROPERTIES OF MATTER** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | List any two applications of laser. | | CO1 | U | 1 |
| 2. | State the principle of laser action. | | CO1 | R | 1 |
| 3. | Refractive index is defined as the ratio between\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_.   1. Speed of light in water, speed of light in medium. 2. Speed of light in solid, speed of light in medium. 3. Speed of light in medium, speed of light in vacuum. 4. Speed of light in vacuum, speed of light in medium. | | CO2 | R | 1 |
| 4. | Define total internal reflection in optical fibers | | CO2 | R | 1 |
| 5. | De Broglie wavelength is independent of the \_\_\_\_\_\_\_ of the particle.   1. Charge. (b) Mass. (c) Velocity. (d) Momentum. | | CO3 | U | 1 |
| 6. | There is an uncertainty in measuring the position and momentum simultaneously because   1. The experiment is at fault. 2. The person doing the experiment is not a skilled person. 3. The errors are due to defective instruments. 4. It is an inherent nature of atomic world. | | CO3 | R | 1 |
| 7. | The frequency of infra sound is below  (a) 20 Hz. (b) 20KHz. (c) 200 Hz. (d) 200KHz. | | CO4 | U | 1 |
| 8. | Sound travels faster in \_\_\_\_\_\_ medium.   1. Liquid. 2. Gaseous. 3. Solid. 4. Colloidal. | | CO4 | R | 1 |
| 9. | The frequency of ultra sound is above  (a) 20 Hz. (b) 20KHz. (c) 200 Hz. (d) 200KHz. | | CO5 | U | 1 |
| 10. | Ultrasound can be used in the medical field True/False | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Define population inversion. | | CO1 | A | 3 |
| 12. | Explain the term acceptance angle with a neat diagram. | | CO2 | U | 3 |
| 13. | State Hook’s Law | | CO3 | An | 3 |
| 14. | State Heisenberg’s Uncertainty Principle. | | CO4 | U | 3 |
| 15. | Explain the term “Reverberation Time”. | | CO5 | An | 3 |
| 16. | Describe the industrial applications of ultrasonic waves. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Discuss in detail, the construction, principle and working of He-Ne laser with energy level diagram. | CO1 | An | 12 |
|  |  |  |  |  |  |
| 18. | a. | Derive an expression for numerical aperture in terms of refractive indices of core and cladding of an optical fiber cable. | CO2 | An | 6 |
|  |  |  |  |  |  |
| 19. | a. | Elaborate on the method of finding the Young’s modulus of a wooden beam by uniform bending method. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. | a. | Explain the construction, working, theoretical and experimental calculations and conclusion of Davisson Germer experiment in detail and prove the existence of matter waves. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. | a. | State the factors affecting the acoustics of a good auditorium. Explain in detail how they affect the quality of sound and suggest suitable remedies for the same. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | Illustrate the recording and reading of a hologram with necessary diagrams. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 23. | a. | Explain in detail with necessary block diagram, the working of an optical fiber communication system. | CO2 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Define magnetostriction effect. Explain the construction and working of the magnetostriction oscillator with the required circuit diagram and equations. | CO6 | An | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Impart knowledge on the fundamentals of various lasers and its application in Fibre optics. |
| **CO2** | Understand the principle of fiber optics and lasers |
| **CO3** | Apply the relationship between properties of matter and the thermal physics. |
| **CO4** | Impart knowledge on the basic concepts of quantum mechanics and its application |
| **CO5** | Impart knowledge on principles of acoustics and application of ultrasonic waves |
| **CO6** | Design devices based on ultrasonic generators |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 1 | 15 | 12 |  |  | 29 |
| **CO2** | 2 | 3 | 12 | 12 |  |  | 29 |
| **CO3** | 1 | 1 | 12 | 3 |  |  | 17 |
| **CO4** | 1 | 4 |  | 12 |  |  | 17 |
| **CO5** |  | 1 | 12 | 3 |  |  | 16 |
| **CO6** |  | 4 |  | 12 |  |  | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **19PH1009** | **Duration** | **3hrs** |
| **Course Name** | **ENGINEERING PHYSICS - ELECTROMAGNETICS, OPTICS AND PROPERTIES OF MATTER** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Identify the various types of excitation mechanism in a laser system  a. Chemical, Electrical, Optical b. Electrical, Optical, Magnetic,  c. Optical, Magnetic, Thermal d. Magnetic, Thermal, Piezoelectric | | CO1 | U | 1 |
| 2. | Point out an example for population inversion by optical pumping method.  a. Nd:YAG Laser b. Argon Laser c. He-Ne Laser d. Hydrogen fluoride Laser | | CO1 | R | 1 |
| 3. | A laser source emits radiation only in one direction is called \_\_\_\_\_\_\_\_\_ | | CO2 | R | 1 |
| 4. | Fiber optic cable operate at frequencies near  a) 2 GHz b) 20 MHz c) 200 MHz d) 800 THz | | CO2 | R | 1 |
| 5. | On the points of stable equilibrium, the potential energy value is \_\_\_\_\_.  a. Minimum b. Maximum c. Infinity d. Unity | | CO3 | U | 1 |
| 6. | For under damping, the natural frequency of a system is \_\_\_\_\_\_\_\_ the frictional forces.  a. Much greater than b. Much smaller than c. Equal to d. Zero compared to | | CO3 | R | 1 |
| 7. | As a pulse travels along a stretched string and strikes a fixed end, it exerts a \_\_\_\_ on the support.  a. Force b. Magnetic field c. Electric field d. Temperature | | CO4 | U | 1 |
| 8. | \_\_\_\_\_\_\_ is the loss of energy that goes into heating a dielectric material in a varying electric field.  a. Dielectric loss b. Magnetic loss c. Electric loss d. Electromagnetic loss | | CO4 | R | 1 |
| 9. | When does a dielectric become a conductor? a) At avalanche breakdownb) At high temperature c) At dielectric breakdownd) In the presence of magnetic field | | CO5 | U | 1 |
| 10. | Piezoelectric effect involves, generation of mechanical stress. True or false? | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Explain any two pumping methods used in Lasers for achieving population inversion. | | CO1 | An | 3 |
| 12. | An optical fiber has a core refractive index of 1.6 and cladding refractive index of 1.5 Determine the acceptance angle for the fiber. | | CO2 | E | 3 |
| 13. | Write down the time period of simple pendulum. | | CO3 | E | 3 |
| 14. | Describe transverse waves? Give one example. | | CO4 | U | 3 |
| 15. | Define Polarizability. | | CO5 | R | 3 |
| 16. | State Ampere’s Circuital Law. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No 17 to 23, Q.No 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the energy level diagram of Helium Neon laser with suitable diagram and explain the working of He-Ne laser. | CO1 | An | 8 |
|  | b. | Describe the components of laser with necessary diagram. | CO1 | A | 4 |
| 18. | a. | Define and derive expression for numerical aperture. Hence explain why numerical aperture is small for a graded index fiber in comparison to an identical step index fiber. | CO2 | An | 8 |
|  | b. | Derive an expression for numerical aperture of an optical fiber. | CO2 | A | 4 |
| 19. | a. | Define simple harmonic oscillation. Explain why every simple harmonic motion is a periodic motion whereas the converse need not be true. | CO3 | A | 8 |
|  | b. | Define time period of simple harmonic motion. | CO3 | U | 4 |
| 20. | a. | Illustrate how the overtones are produced in closed organ pipe and in open organ pipe. | CO4 | An | 8 |
|  | b. | Explain different types of waves in acoustics and mention few of its properties. | CO4 | A | 4 |
| 21. | a. | Derive the Clausius-Mosotti equation and explain how it can be used to determine dipole moment of a polar molecule. | CO5 | E | 8 |
|  | b. | Write the condition of Frequency and Temperature Dependence of Polarization. Also define dielectric loss. | CO5 | An | 4 |
| 22. | a. | Illustrate how Hologram is working and list out its medical applications. | CO5 | A | 8 |
|  | b. | Describe in brief about the different Polarizations in dielectrics. | CO5 | E | 4 |
| 23. | a. | Explain the term of dielectric loss and dielectric break down in detail. | CO6 | An | 8 |
|  | b. | State and explain the condition about Damped Harmonic Oscillations. | CO6 | A | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Drive an expression for Gauss Divergence Theorem. | CO6 | An | 8 |
|  | b. | Obtain the Poynting’s theorem for the conservation of energy in electromagnetic field. | CO6 | E | 4 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

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|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Understand the basics of Lasers. | | | | | | | |
| CO2 | Explain and interpret the concepts of Optical Fiber Cables. | | | | | | | |
| CO3 | Apply the fundamentals laws concerning Oscillations. | | | | | | | |
| CO4 | Discern the laws governing Wave Motion. | | | | | | | |
| CO5 | Evaluate and perceive the various laws governing Dielectric Materials. | | | | | | | |
| CO6 | Understand the basic principles Electromagnetic Theory. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / P | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 1 | 2 | 4 | 11 |  |  | 18 |
| CO2 | | 2 | 1 | 4 | 8 | 3 |  | 18 |
| CO3 | | 1 | 5 | 8 | 8 | 3 |  | 25 |
| CO4 | | 1 | 4 | 4 | 8 |  |  | 17 |
| CO5 | | 3 | 1 | 8 | 4 | 12 |  | 28 |
| CO6 | |  | 4 | 4 | 16 | 4 |  | 28 |
|  | | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20OP2001** | **Duration** | **3hrs** |
| **Course Name** | **PHYSICAL AND GEOMETRICAL OPTICS I** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | Describe about the reflection and refraction laws. Use a ray model to depict how waves propagate. | CO1 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Describe the Fermat's principle and write about the characteristics of light. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 3. |  | Describe how waves that are partially reflected from the top and bottom surfaces of the air film interfere to generate Newton's rings. | CO2 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Describe how stationary waves can cause both constructive and destructive interference. | CO2 | A | 20 |
|  |  |  |  |  |  |
| 5. |  | Explain the Fraunhoffer and Fresnel diffraction caused by a single slit. | CO3 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe the application of the Nicol prism as an analyzer. | CO3 | E | 10 |
|  | b. | Enumerate about the many kinds of zone plates. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 7. |  | Summarize the spectrum of absorption and emission spectra. | CO4 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Explain about the unique features of the laser, include an explanation of the Raman spectrum analysis, along with the emission and absorption spectra. | CO5 | E | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | What is the Michelson interferometer's working principle? What is the process by which the wavelength of a monochromatic source (a laser source) is ascertained using the Michelson Interferometer? | CO6 | C | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Describe the usage of various theories and components of light. |
| CO2 | Report the effect of interference of light on lenses. |
| CO3 | Apply knowledge of combination of optical principles such as interference, diffraction, polarization in optical elements. |
| CO4 | Design an optical system, component to meet desired needs of optometry. |
| CO5 | Solve problems in optical physics and lens assembly. |
| CO6 | Demonstrate the techniques, skills, and modern tools necessary for optical physics in analytical instruments. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 20 | 20 |  |  |  |  | 40 |
| CO2 |  |  | 20 | 20 |  |  | 40 |
| CO3 |  |  |  | 20 | 10 |  | 30 |
| CO4 |  |  | 10 | 20 |  |  | 30 |
| CO5 |  |  |  |  | 20 |  | 20 |
| CO6 |  |  |  |  |  | 20 | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20OP2002** | **Duration** | **3hrs** |
| **Course Name** | **GENERAL ANATOMY AND GENERAL PHYSIOLOGY** | **Max. Marks** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **CO / BL** | **Marks** |
| 1. | a. | Discuss in detail the different parts of bone systems and junctions. | CO1 / R | 10 |
|  | b. | Define a Joint. Explain the features of Synovial Joint. Classify the various types of Synovial Joint with suitable examples. | CO1 / R | 10 |
| **(OR)** | | | | |
| 2. | a. | Define erythropoiesis. Describe in detail about the stages of erythropoiesis. Add a note on maturation factors. | CO1 / U | 10 |
|  | b. | Discuss Structural differences between Skeletal, Cardiac and Smooth Muscles. | CO2 / R | 10 |
|  |  |  |  |  |
| 3. | a. | Describe in detail with a help of diagram the mechanism of skeletal muscle contraction. | CO2 / R | 10 |
|  | b. | What is calcium homeostasis? Explain the role of parathyroid hormone in calcium homeostasis? Add a note on tetany. | CO3 / R | 10 |
| **(OR)** | | | | |
| 4. | a. | Name the different Endocrine Glands present in the Human Body. Describe in detail the anatomy of the Thyroid Gland. | CO3 / U | 20 |
|  |  |  |  |  |
| 5. | a. | Explain how oxygen transport occurs by hemoglobin. Which are proteins involved in the oxygen transport process? Discuss hypoxia. | CO4 / R | 10 |
|  | b. | Explain the following terms: (i) Fibrinolysis, (ii) Anemia (iii) Hemostasis, (iv) ESR, (v) Plasma Protein. | CO4 / R | 10 |
| **(OR)** | | | | |
| 6. | a. | Define Landsteiner’s Law. Explain ABO blood grouping system. Add a note on Erythroblastosis foxtails. | CO4 / R | 10 |
|  | b. | Define cardiac output. Write a short note on factors regulating cardiac output. | CO5 / R | 10 |
|  |  |  |  |  |
| 7. | a. | Enumerate the parts of respiratory system and write in detail about the Lung. | CO5 / R | 10 |
|  | b. | Write in detail the regulation of Respiration. Define Tidal volume and vital capacity. | CO5 / R | 10 |
| **(OR)** | | | | |
| 8. | a. | Name the different parts and functions of Digestive System. Describe in detail about Stomach. | CO4 / R | 10 |
|  | b. | Enumerate the organs of digestion including accessory organs of digestion. | CO4 / U | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Classify the Nervous system and write in detail about the functional areas of Cerebrum. | CO6 / R | 10 |
|  | b. | What is Menstrual Cycle? Explain the Ovarian changes taking place during Menstrual Cycle. | CO6 / R | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Recall outline on cells, their functions and membrane transportation of cells. |
| CO2 | Understand the composition of blood and its function on maintaining homeostasis. |
| CO3 | Elaborate the components of respiratory and cardiovascular systems. |
| CO4 | Describe about the anatomical locations, structures and their physiological functions. |
| CO5 | Analyse the structure and functions of nervous system and parts of brain. |
| CO6 | Evaluate the functions of eye, ear and kidney. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 12 | 6 |  |  | - | - | 18 |
| CO2 | 12 |  |  |  |  |  | 12 |
| CO3 | 6 | 12 |  |  | - | - | 18 |
| CO4 | 24 | 6 |  |  |  |  | 30 |
| CO5 | 18 |  |  |  | - | - | 18 |
| CO6 | 12 |  |  |  | - | - | 12 |
|  | | | | | | | **100** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20OP2007** | **Duration** | **3hrs** |
| **Course Name** | **COMPUTING AND COMPUTER APPLICATIONS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Define an input device in a computer and discuss any three in detail. | CO1 | U | 15 |
|  | b. | List the characteristics of a computer. | CO1 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | What are the common characteristics of a non-impact printer? Elaborate on their types. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 3. | a. | Give a detailed account on the different parts of a motherboard. | CO2 | U | 15 |
|  |  | Outline about a search engine and draw the attention of crawler based search engine. | CO2 | U | 5 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Elucidate about a computer network and classify it based on the area by geography. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 5. | a. | Write short notes on operating system and discuss the basic features and components of Linux. | CO3 | A | 15 |
|  | b. | Mention few points on low level language. | CO3 | U | 5 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Give the definition for a programming language. Distinguish the programming language based on their generation of development. | CO4 | A | 15 |
|  | b. | State the differences between compiler and interpreter. | CO4 | U | 5 |
|  |  |  |  |  |  |
| 7. | a. | Elucidate on the different types of operators used in the computer program with necessary examples. | CO5 | A | 15 |
|  | b. | Mention the five rules for naming identifiers in a C program. | CO5 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Discuss about the function used in C program and elaborate on the two basic types of functions in detail. | CO5 | A | 15 |
|  | b. | Draw the syntax for the following,   1. do while loop 2. for loop | CO5 | R | 5 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Give an overview on the need, features and advantages of object oriented programming language. | CO6 | An | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recall the history of computers and its characteristics. |
| CO2 | Understand the functions of different parts in hardware and software tools. |
| CO3 | Apply the knowledge on office application suite for programming specific cases. |
| CO4 | Interpret the functions, arrays, union, structures and pointers in C language. |
| CO5 | Analyze specific clinical data required for the history of individuals. |
| CO6 | Evaluate the data for any specific conditions to process for further references and data processing. |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 5 | 35 | - | - | - | - | 40 |
| CO2 | - | 40 | - | - | - | - | 40 |
| CO3 | - | 5 | 15 | - | - | - | 20 |
| CO4 | - | 5 | 15 | - | - | - | 20 |
| CO5 | 10 | - | 30 | - | - | - | 40 |
| CO6 | - | - | - | 20 | - | - | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20OP2011** | **Duration** | **3hrs** |
| **Course Name** | **OPTOMETRIC OPTICS I** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Distinguish and describe the aberrations in ophthalmic lenses. | CO1 | Apply | 15 |
|  | b. | Obtain the front vertex power of the lens that has surface curves of +12.00D and -4.00D. Also it has a center thickness of 8 mm and the refractive index is 1.60. | CO1 | Analyze | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | With necessary diagrams and power cross discuss about cylindrical, spherical and sphero-cylindrical lenses. | CO2 | Understand | 15 |
|  | b. | Briefly explain refraction, vertex power and vertex distance. | CO2 | Remember | 5 |
|  |  |  |  |  |  |
| 3. | a. | List out and mention the various steps involved in the fabrication of lens. | CO3 | Understand | 20 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Illustrate the following   1. lens surfacing 2. surface generation processes 3. Edging, Mounting and inspection of lens | CO3 | Understand | 20 |
|  |  |  |  |  |  |
| 5. | a. | Elaborate the various defects in the material of the lens and on lens surfaces in detail. | CO3 | Analyze | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Give an account on the thermal and chemical processing methods for toughening of lenses. | CO4 | Understand | 15 |
|  | b. | Mention the various characteristics of toughened lenses. | CO4 | Apply | 5 |
|  |  |  |  |  |  |
| 7. | a. | Classify strabismus and discuss the neutralization of them using prism with necessary diagram. | CO6 | Evaluate | 15 |
|  | b. | Write short notes on ophthalmic prism, units of prism power and prentice formula. | CO6 | Remember | 5 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Give an account on the following with examples,   1. Resultant horizontal and vertical prismatic effect when prism is placed in front of the eye. 2. Prismatic effect of the lens. | CO6 | Evaluate | 15 |
|  | b. | Explain the various effects of prism on the movement of eyes. | CO6 | Understand | 5 |
|  |  |  |  |  |  |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Clarify the construction of spectacle frames, its measurement and markings in detail. | CO5 | Understand | 20 |

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Recall the types of optical lenses |
| CO2 | Understand the properties of optical lenses through laws of physics |
| CO3 | Apply the knowledge on optical properties in lens manufacturing |
| CO4 | Analyze the quality of lenses |
| CO5 | Identify the type of spectacle frames |
| CO6 | Appreciate the knowledge gained on optical lenses to solve vision problems |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  |  | 15 | 5 |  |  | 20 |
| CO2 | 5 | 15 |  |  |  |  | 20 |
| CO3 |  | 40 |  | 20 |  |  | 60 |
| CO4 |  | 15 | 5 |  |  |  | 20 |
| CO5 |  | 20 |  |  |  |  | 20 |
| CO6 | 5 | 5 |  |  | 30 |  | 40 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20OP2012** | **Duration** | **3hrs** |
| **Course Name** | **OCULAR DISEASES I** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe in detail about the anatomy of nasolacrimal system. | CO1 | R | 10 |
|  | b. | Describe in detail about the congenital nasolacrimal duct obstruction. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Draw the lacrimal system and label the parts, explain the physiology of tear drainage. | CO1 | R | 10 |
|  | b. | Describe in detail about acquired nasal lacrimal duct obstruction i) Conjunctivochalasis, ii) Primary and secondary punctal stenosis, iii) Canlicular obstruction. | CO1 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe in detail about the disorders of eye lashes. | CO2 | R | 10 |
|  | b. | Write short notes on capillary haemangioma, port wine stain, sturge weber syndrome. | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Write short notes on chalazion, write short notes on dermis and epidermis of eye lids. | CO2 | R | 10 |
|  | b. | Describe in detail about Ptosis, classification, clinical evaluation | CO2 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | Write short notes on i) Orbital cellulitis and intra-orbital abscesses,  ii) Pre-septal cellulitis iii) Orbital mucormycosis | CO3 | U | 10 |
|  | b. | Describe in detail about idiopathic orbital inflammatory diseases (pseudotumours), write notes on exophthalmometry | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Write short notes on anatomy of the orbit, write short notes on blow-out fracture. | CO3 | U | 10 |
|  | b. | Describe in detail about thyroid eye diseases (Grave’s Ophthalmology). | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe in detail about the anatomy of conjunctiva. | CO4 | R | 10 |
|  | b. | Write short notes on conjunctival degenerations  i) Pterygium,  ii) Pinguecula. | CO4 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain in detail about chronic bacterial and angular conjunctivitis. | CO4 | R | 10 |
|  | b. | Describe in detail about ophthalmic neonatorum. | CO4 | R | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe in detail about anatomy and physiology of cornea. | CO5 | A | 10 |
|  | b. | Describe in detail about corneal dystrophies i) Epithelial basement membrane dystrophy, ii) lattice dystrophy iii) Fuch’s endothelial dystrophy | CO5 | A | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Recall the anatomy of eye |
| CO2 | Understand the functioning of eyes |
| CO3 | Apply the knowledge of eye anatomy in finding the eye tumors |
| CO4 | Analyze the quality of vision through eye anatomy |
| CO5 | Identify the type of eye tumor, conjunctiva and cornea |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 40 |  |  |  |  |  | 40 |
| CO2 | 40 |  |  |  |  |  | 40 |
| CO3 |  | 40 |  |  |  |  | 40 |
| CO4 | 40 |  |  |  |  |  | 40 |
| CO5 |  |  | 20 |  |  |  | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20OP2014** | **Duration** | **3hrs** |
| **Course Name** | **OCULAR ANATOMY AND OCULAR PHYSIOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Draw a diagram of the EOM of the eyeball and describe its origin, position, and innervation. | CO1 | U | 15 |
|  | b. | 1) Mentioned the parts of floor of the orbit.  2) Discuss the seven EOM of the eye ball. | CO1 | U | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Tabulate a list of EOM actions and cardinal gaze positions. | CO1 | R | 10 |
|  | b. | Briefly explain about the extra ocular muscle. | CO1 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the layers of Cornea with diagrams. | CO2 | U | 15 |
|  | b. | Summarize the origin of the cornea briefly. | CO2 | U | 5 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the thickness, radius of curvature and dimensions of cornea. | CO2 | A | 15 |
|  | b. | 1) Explain in brief why cornea is transparent?  2) Name the components of the lacrimal apparatus system and illustrate it. | CO2 | U | 5 |
|  |  |  |  |  |  |
| 5. | a. | 1) Distinguish between depth of field and pupil size.  2) Describe presbyopia and how it is treated. | CO3 | A | 10 |
|  | b. | Explain theories of accommodation. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain about each layer of lens briefly. | CO3 | U | 10 |
|  | b. | Explain anomalies of accommodation. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Discuss about the pathway of light reflex. | CO4 | U | 10 |
|  | b. | Describe Afferent & Efferent pathway defects. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Show a demonstration of pupillary light near dissociation. | CO4 | U | 10 |
|  | b. | Describe the sympathetic pathway defect. | CO4 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain in detail about Horner’s Syndrome. | CO5 | U | 15 |
|  | b. | Write a brief description of Photochemistry of Retina. | CO6 | A | 5 |

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|  | **COURSE OUTCOMES** |
| CO1 | Recall the working of eye lid, lacrimal apparatus and extra ocular muscles. |
| CO2 | Understand the cornea aqueous secretion and dynamics. |
| CO3 | Apply the knowledge of crystalline lens and accommodation for curing eye anomalies. |
| CO4 | Analyze the quality of iris and pupil. |
| CO5 | Evaluate the problems associated with retina and acuity of vision. |
| CO6 | Appreciate the knowledge gained on ocular physiology in rectifying defects in colour vision. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 10 | 20 |  | 10 |  |  | 40 |
| CO2 |  | 25 |  | 15 |  |  | 40 |
| CO3 |  | 20 |  | 20 |  |  | 40 |
| CO4 |  | 30 |  | 10 |  |  | 40 |
| CO5 |  | 15 |  |  |  |  | 15 |
| CO6 |  |  |  | 05 |  |  | 05 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20OP2015** | **Duration** | **3hrs** |
| **Course Name** | **PATHOLOGY AND MICROBIOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Interpret the complexity of ophthalmic wound healing in various pathologies. | CO1 | A | 10 |
|  | b. | Describe the incidence and basic mechanism of any one ocular infection. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the mechanism of an intraocular tumor – Retinoblastoma. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 3. | a. | Classify the condition of anemia and the underlying mechanism with respect to ophthalmic infections. | CO2 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Summarize the anatomy and physiology of eyelid and its associated disorders. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 5. | a. | Describe the types of cataracts observed in pathological conditions. | CO3 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the anatomy and physiology of retina and its associated disorders. | CO5 | U | 20 |
|  |  |  |  |  |  |
| 7. | a. | Explain the method to check the sensitivity of microorganism to an antibiotic. | CO4 | R | 10 |
|  | b. | Write on different sterilization methods adapted in microbiological laboratory. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Discuss on various phases in microbial growth kinetics. | CO4 | U | 20 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. |  | Assess and reflect the pathology of Ophthalmic Infections occurring in the Eye with respect to: |  |  |  |
|  | a. | Ocular Bacterial Infections. | CO6 | E | 10 |
|  | b. | Ocular Parasitic Infections. | CO6 | E | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recall the diseases associated with eyes. |
| CO2 | Understand the science of hematology. |
| CO3 | Understanding the pathology of cataract. |
| CO4 | Apply the knowledge of morphology of bacterial cell in testing the eyes. |
| CO5 | Analyze the quality of vision through basic immunology studies. |
| CO6 | Identify the type of eye tumor and treatment with a thorough knowledge on pathology and microbiology. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 20 | 10 |  |  |  | 40 |
| CO2 |  | 20 | 20 |  |  |  | 40 |
| CO3 | 20 |  |  |  |  |  | 20 |
| CO4 | 10 | 20 | 10 |  |  |  | 40 |
| CO5 |  | 20 |  |  |  |  | 20 |
| CO6 |  |  |  |  | 20 |  | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20OP2018** | **Duration** | **3hrs** |
| **Course Name** | **OPTOMETRIC OPTICS II** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | Classify tinted lenses based on the tinting and discuss the characteristics, advantages and limitations of each tinting technique and their suitability for various activities and environmental conditions. | CO1 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Analyze the impact of absorptive glasses on visual comfort and performance in outdoor activities. | CO1 | An | 20 |
|  |  |  |  |  |  |
| 3. |  | Compare and contrast the functionalities of polarizing filters and reflecting filters in optical applications. How do these filters differ in their ability to adapt to changing lighting conditions and improve the overall viewing experience? | CO2 | E | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Explore the technology behind photochromic filters and their application in eyewear for light-sensitive individuals. | CO2 | A | 20 |
|  |  |  |  |  |  |
| 5. |  | Paraphrase the anatomy, types, characteristics and disadvantages of bifocal lenses with neat sketches. Compare its design and wearer adaptation processes with progressive lenses. | CO2 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Give detailed information about the ghost images by reflections from the spectacle lenses and discuss the role of anti-reflective coatings in these reflections for spectacle wearers. | CO3 | A | 20 |
|  |  |  |  |  |  |
| 7. |  | Investigate the manufacturing processes and materials used in producing anti-scratch coating for optical lenses. | CO4 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Evaluate the impact of mirror coatings on optical lenses and also discuss the design and manufacturing challenges associated with applying mirror coatings to optical lenses. | CO4 | E | 20 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. |  | Sketch the manufacturing methods of aspheric lenses in detail and then compare the optical performance of aspherical lenses with traditional spherical lenses. | CO5 | U | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Define the properties and characteristics of the tinted and protective lenses |
| CO2 | Describe the different types of filters used in lenses with their merits |
| CO3 | Examine the reflected images and ghost images from the spectacle lenses |
| CO4 | Analyse the effect of anti-reflective, anti-fog and anti-scratch coatings on the lenses |
| CO5 | Appraise on the size, shape and mounting of the lenses |
| CO6 | Design and develop flawless, purpose solving spectacle lenses suitable for the patients |

|  |  |  |  |  |  |  |  |
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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  |  | 20 | 20 |  |  | 40 |
| CO2 |  | 20 | 20 |  | 20 |  | 60 |
| CO3 |  |  | 20 |  |  |  | 20 |
| CO4 |  | 20 |  |  | 20 |  | 40 |
| CO5 |  | 20 |  |  |  |  | 20 |
| CO6 |  |  |  |  |  |  | - |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20OP2019** | **Duration** | **3hrs** |
| **Course Name** | **OCULAR DISEASES II** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain in detail about asteroid hyalosis which affects the vitreous of the eye. | CO1 | A | 15 |
|  | b. | Infer the disease definition and etiology of cholesterolosis bulbi. | CO1 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Compare and contrast several developmental abnormalities of the vitreous. | CO1 | U | 15 |
|  | b. | Analyze the risk factors of juvenile retinoschisis. | CO1 | An | 5 |
|  |  |  |  |  |  |
| 3. | a. | Analyze the etiology, pathology, pathophysiology, diagnosis and management of retinoblastoma. | CO2 | An | 15 |
|  | b. | Identify the symptoms of astrocytoma. | CO2 | A | 5 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the metabolic disorders affecting the retina of the eye in detail. | CO2 | U | 15 |
|  | b. | List the electromagnetic radiation effects on the retina. | CO2 | R | 5 |
|  |  |  |  |  |  |
| 5. | a. | Define Ocular Motor Apraxia and its etiology, pathology, diagnosis, and management. | CO3 | U | 15 |
|  | b. | Apply the modern treatment plans to the following condition: Nystagmus and describe its outcomes. | CO3 | A | 5 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Compare and contrast the blood supply of anterior and posterior visual systems. | CO6 | E | 15 |
|  | b. | Evaluate the disorders of visual integration system. | CO6 | E | 5 |
|  |  |  |  |  |  |
| 7. | a. | Analyze the differences between nuclear sclerosis, cortical, and posterior subcapsular cataracts and their symptoms. | CO4 | An | 15 |
|  | b. | Define secondary cataract and trauma induced cataract. | CO4 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | State and explain congenital deformity of the lens that causes it to be cone-shaped instead of round. | CO4 | R | 15 |
|  | b. | Identify the conditions where the lens is dislocated from its normal position within the eye. | CO4 | A | 5 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss in detail the illness caused by anterior segment trauma of the eye. | CO5 | A | 15 |
|  | b. | Analyze the effects of posterior segment trauma of the eye. | CO5 | An | 5 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | List the abnormalities, trauma and inflammation related to vitreous body. |
| CO2 | Discuss in detail about the retinal disorder and related diseases. |
| CO3 | Interpret on the background, defects and techniques involved in neuro-ophthalmology. |
| CO4 | Illustrate clearly on the supranuclear control of eye movements. |
| CO5 | Appraise on the anatomy, pathophysiology and aging process. |
| CO6 | Analyze on the causes, therapy and drug related to ocular diseases. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 5 | 15 | 15 | 5 | -- | -- | 40 |
| CO2 | 5 | 15 | 5 | 15 | -- | -- | 40 |
| CO3 | -- | 15 | 5 | -- | -- | -- | 20 |
| CO4 | 20 | -- | 5 | 15 | -- | -- | 40 |
| CO5 | -- | -- | 15 | 5 | -- | -- | 20 |
| CO6 | --- | -- | -- | --- | 20 | -- | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20OP2020** | **Duration** | **3hrs** |
| **Course Name** | **VISUAL OPTICS II** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe astigmatism and it types in detail with necessary diagram. | CO1 | R | 6 |
|  | b. | Explain Aphakia and Pseudo Aphakia in detail. Discuss various disadvantage of Aphakia with necessary examples and diagrams. | CO1 | A | 14 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define the term presbyopia. Briefly discuss the symptoms and treatment of presbyopia. | CO1 | U | 6 |
|  | b. | Discuss the clinical characteristics of amblyopia in detail. Also, explain the prevention and treatment of amblyopia in detail. | CO1 | A | 14 |
|  |  |  |  |  |  |
| 3. | a. | Describe different types of accommodation in detail | CO2 | R | 6 |
|  | b. | Compare and contrast the concepts of near point and far point of accommodation in detail. Explain near point and far point of accommodation for the hyperopic and myopic eyes with diagrams | CO2 | A | 14 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Differentiate the eye conditions based on axial versus refractive ametropia. | CO2 | U | 6 |
|  | b. | Explain axial and refractive ametropia in detail with examples using + and – lens corrections. Also illustrate the concepts in myopic eye conditions. | CO2 | An | 14 |
|  |  |  |  |  |  |
| 5. | a. | Explain the principle of retinoscope and its various methods in detail. | CO3 | U | 6 |
|  | b. | Illustrate the projection and observation system of a streak retinosocpe in detail with adequate diagram to explain it. | CO3 | An | 14 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Interpret the concepts and details of static and dynamic retinoscope. | CO4 | R | 6 |
|  | b. | Describe the ‘Neutralisation’ method in retinoscope. Explain the various prerequisites involved to perform retinoscopy in labs. | CO4 | A | 14 |
|  |  |  |  |  |  |
| 7. | a. | Calculate the spectacle refraction if the ocular refraction is -24.0 D and the vertex distance is 13.00mm when the focal length is -5cm. | CO4 | U | 6 |
|  | b. | Demonstrate how the astigmatic fan test will be conducted to find out the axis and magnitude of the error astigmatism is present in patients with relevant diagrams. | CO5 | A | 14 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Discuss ocular and spectacle refraction in detail with examples | CO5 | R | 6 |
|  | b. | Describe Binocular refraction and advantages over monocular refraction in brief. Illustrate how the monocular viewing under binocular conditions can be achieved using concept septum and fogging. | CO5 | An | 14 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Differentiate the concept of ocular accommodation and spectacle accommodation with an example. | CO6 | A | 6 |
|  | b. | Explain the terms vertex distance and its effects, vertex compensation power and effective power in detail with appropriate examples. | CO6 | An | 14 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the different types of defects associated with vision |
| CO2 | Recognize various refractive conditions and relate both accommodation and convergence |
| CO3 | Review on the methods and optimum conditions such as static and dynamic of retinoscopy |
| CO4 | Compare the objective and subjective refractive methods along with other methods for  astigmatism |
| CO5 | Interpret on the astigmatic test and difficulties in objective tests |
| CO6 | Analyze and correct the defects that are connected to the spectacles |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 6 | 6 | 14 | 14 |  |  | 40 |
| CO2 | 6 | 6 | 14 | 14 |  |  | 40 |
| CO3 |  | 6 |  | 14 |  |  | 20 |
| CO4 | 6 | 6 | 14 |  |  |  | 26 |
| CO5 | 6 |  | 14 | 14 |  |  | 34 |
| CO6 |  |  | 6 | 14 |  |  | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20OP2021** | **Duration** | **3 hrs** |
| **Course Name** | **OPTOMETRIC INSTRUMENTATIONS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain in detail, the various parts of an autorefractometer such as light source, projector, receiver, control panel and printer. | CO1 | A | 15 |
|  | b. | List the common pathologies that can be identified by an autorefractometer. | CO1 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Distinguish between the key features and limitations of Snellen charts, LogMAR charts, and Lea Symbols charts used for visual acuity testing. | CO1 | U | 15 |
|  | b. | Analyze the advantages and disadvantages of different trial lens materials (glass, plastic) and frame designs (full aperture, half-eye) considering factors like weight, durability, cost, and patient comfort. | CO1 | An | 5 |
|  |  |  |  |  |  |
| 3. | a. | Elucidate the functions of different parts such as light source, aperture, and viewing lenses of an ophthalmoscope. | CO2 | An | 15 |
|  | b. | Compare and contrast direct and indirect ophthalmoscopes. | CO2 | A | 5 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Identify the similarities and differences between lensometer and lens clock in terms of their function and the measurements they provide. | CO2 | U | 15 |
|  | b. | List any two applications of scanning laser devices and briefly describe them. | CO2 | R | 5 |
|  |  |  |  |  |  |
| 5. | a. | Summarize various parts of an applanation tonometer and a non-contact tonometer and their functions. | CO3 | U | 15 |
|  | b. | Explain the purpose of tonometry in eye care and describe two factors that can influence a tonometer reading. | CO3 | A | 5 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Evaluate the advantages and disadvantages of two different fundus camera imaging techniques (Mydriasis vs. Non-Mydriasis) for capturing retinal images. | CO6 | E | 15 |
|  | b. | Evaluate the usefulness of external eye photography in optometric practice. | CO6 | E | 5 |
|  |  |  |  |  |  |
| 7. | a. | Analyze the principles and applications of ophthalmic ultrasonography in the diagnosis and management of eye diseases. | CO4 | An | 15 |
|  | b. | Identify the type of waves are used in ophthalmic ultrasonography and list their properties. | CO4 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | List and briefly describe the three main types of electrodiagnostic tests as mentioned below: Electroretinography (ERG), Visual Evoked Potential (VEP), and Electrooculography (EOG). | CO4 | R | 15 |
|  | b. | A patient complains of difficulty seeing at night. Which electrodiagnostic test (ERG, VEP, EOG) would be most appropriate to assess their condition, and why? | CO4 | A | 5 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | A 40-year-old diabetic patient reports difficulty reading entire lines of text. Explain how you would use perimetry to assess their visual field and what information you would expect to find based on their symptoms. | CO5 | A | 15 |
|  | b. | A patient with suspected glaucoma undergoes a perimetric test. The results show a localized scotoma (blind spot) in the lower temporal visual field of the right eye. Analyze the potential impact of this scotoma on the patient's daily activities. | CO5 | An | 5 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the various topics related to refractive instruments. |
| CO2 | Discuss about the design, features and advantages of ophthalmoscope and related devices. |
| CO3 | Illustrate on the principles, types and uses of tonometers. |
| CO4 | Interpret the techniques involved in fundus camera. |
| CO5 | Utilize the orthoptic and ophthalmic instruments for ultrasonography and electro diagnostics. |
| CO6 | Appraise on the results of various vision testing and screening devices. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 5 | 15 | 15 | 5 | -- | -- | 40 |
| CO2 | 5 | 15 | 5 | 15 | -- | -- | 40 |
| CO3 | -- | 15 | 5 | -- | -- | -- | 20 |
| CO4 | 20 | -- | 5 | 15 | -- | -- | 40 |
| CO5 | -- | -- | 15 | 5 | -- | -- | 20 |
| CO6 | --- | -- | -- | --- | 20 | -- | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20OP2032** | **Duration** | **3 hrs** |
| **Course Name** | **GLAUCOMA** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe the factors influencing the production, circulation, and drainage of aqueous humor in the eye. | CO1 | A | 15 |
|  | b. | Mention the primary function of the aqueous humor in the eye, and how it differs from the vitreous humor. | CO1 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the principles of gonioscopy, including the anatomy of the angle structures of the eye and the technique used to visualize these structures. Describe how gonioscopy is used to assess and classify different types of angle configurations in glaucoma evaluation. | CO1 | U | 15 |
|  | b. | Compare and contrast the advantages and limitations of using direct gonioscopy versus indirect gonioscopy in clinical practice. | CO1 | An | 5 |
|  |  |  |  |  |  |
| 3. | a. | Compare and contrast the pathophysiology, clinical presentation, and management strategies of primary open-angle glaucoma (POAG) with normal-tension glaucoma (NTG). | CO2 | An | 15 |
|  | b. | Apply the principles of treatment for primary open-angle glaucoma to develop a management plan for a patient newly diagnosed with the condition. | CO2 | A | 5 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the pathophysiology of secondary open-angle glaucoma, including the underlying conditions or factors that can lead to increased intraocular pressure (IOP) and optic nerve damage. | CO2 | U | 15 |
|  | b. | List the common causes of secondary open-angle glaucoma and briefly explain how each condition can contribute to elevated intraocular pressure and optic nerve damage. | CO2 | R | 5 |
|  |  |  |  |  |  |
| 5. | a. | Explain the etiology of primary angle closure glaucoma (PACG), including the anatomical factors that predispose individuals to angle closure. | CO3 | U | 15 |
|  | b. | Apply the principles of medical treatment for an acute angle-closure attack in a patient with primary angle closure glaucoma. | CO3 | A | 5 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Evaluate the role of underlying systemic conditions, such as diabetes mellitus and hypertension, in the development of secondary open-angle glaucoma. Discuss how these comorbidities can impact the progression and management of glaucoma in affected individuals. | CO6 | E | 15 |
|  | b. | Evaluate the effectiveness of various treatment modalities, including medications, laser therapy, and surgical interventions, in managing secondary open-angle glaucoma. Compare and contrast the outcomes and complications associated with each treatment option, considering factors such as efficacy, safety, and cost-effectiveness. | CO6 | E | 5 |
|  |  |  |  |  |  |
| 7. | a. | Analyze the pathophysiology of developmental glaucoma, focusing on congenital glaucoma. Describe the structural abnormalities that lead to impaired aqueous humor outflow and elevated intraocular pressure in infants with congenital glaucoma. | CO4 | An | 15 |
|  | b. | List the key clinical features that differentiate congenital glaucoma from other forms of childhood glaucoma. | CO4 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | List and describe the different juvenile glaucoma syndromes, including Axenfeld-Rieger syndrome, Peters anomaly, and aniridia-associated glaucoma. | CO4 | R | 15 |
|  | b. | Apply the principles of treatment for juvenile glaucoma syndromes to develop a management plan for a 15-year-old patient diagnosed with Axenfeld-Rieger syndrome and glaucoma. | CO4 | A | 5 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Develop a comprehensive medical management plan for a patient diagnosed with primary open-angle glaucoma. | CO5 | A | 15 |
|  | b. | Analyze the potential interactions between glaucoma medications and other systemic medications commonly used by elderly patients. | CO5 | An | 5 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the basics of glaucoma. |
| CO2 | Attain clear knowledge on the clinical examination of glaucoma. |
| CO3 | Interpret and diagnosis the different types of glaucoma. |
| CO4 | Articulate the medical characterization of angle closure glaucoma. |
| CO5 | Detect developmental abnormality of angle of anterior chamber leading to high intraocular pressure. |
| CO6 | Adapt the proper medical treatment to normalize and control the intraocular pressure and to prevent loss of visual acuity. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 5 | 15 | 15 | 5 | -- | -- | 40 |
| CO2 | 5 | 15 | 5 | 15 | -- | -- | 40 |
| CO3 | -- | 15 | 5 | -- | -- | -- | 20 |
| CO4 | 20 | -- | 5 | 15 | -- | -- | 40 |
| CO5 | -- | -- | 15 | 5 | -- | -- | 20 |
| CO6 | --- | -- | -- | --- | 20 | -- | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20OP2033** | **Duration** | **3hrs** |
| **Course Name** | **PEDIATRIC OPTOMETRY AND GERIATRIC OPTOMETRY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe the stages of a baby's visual development. | CO1 | U | 10 |
|  | b. | Describe the postnatal variables affecting new borns. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain in-depth about the embryology of the eyes. | CO2 | U | 15 |
|  | b. | Explain the score on the APGAR chart and show how it is used for checking new born babies. | CO2 | An | 5 |
|  |  |  |  |  |  |
| 3. | a. | Give an in depth comment about Extra Ocular Muscle (EOM). | CO3 | A | 10 |
|  | b. | Summarize the course of treatment for congenital cataracts. | CO4 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Write notes about congenital facial and orbital anomalies. | CO2 | C | 10 |
|  | b. | Describe Bruckner's test and its interpretation. | CO4 | R | 10 |
|  |  |  |  |  |  |
| 5. |  | Give a thorough explanation of amblyopia, including its kinds, pathogenesis, diagnosis, and available treatments. | CO4 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Discuss about drooping in detail, addressing its pathophysiology, types, diagnosis, and available treatments. | CO4 | A | 20 |
|  |  |  |  |  |  |
| 7. | a. | Describe in detail the structural alterations in the eyes of the elderly. | CO5 | E | 15 |
|  | b. | Create notes concerning the view through the telescope. | CO3 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Write notes on Primary Open Angle Glaucoma (POAG), pathophysiology, clinical features and treatment options. | CO5 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Write complete notes regarding the assessment of elderly people's low vision. | CO6 | R | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the principal theories of childhood and visual development |
| CO2 | Analyse a thorough pediatric history which encompasses the relevant developmental, visual, medical and educational issues |
| CO3 | Attain clear knowledge on the accommodative-vergence system to assess the pediatric eye disorders |
| CO4 | Analyse the techniques for examining visual function of children of all ages and an understanding varied management concepts of pediatric vision disorders |
| CO5 | Identify and investigate the age related changes in the eyes |
| CO6 | Demonstrate dispensing contact lens, low vision aids and referral to the surgeon |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 10 |  |  |  |  | 20 |
| CO2 |  | 15 |  | 5 |  | 10 | 30 |
| CO3 | 5 |  | 10 |  |  |  | 15 |
| CO4 | 10 |  | 20 | 20 | 10 |  | 60 |
| CO5 |  | 20 |  |  | 15 |  | 35 |
| CO6 | 20 |  |  |  |  |  | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20OP2034** | **Duration** | **3hrs** |
| **Course Name** | **CONTACT LENS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain in detail about the contact lens materials. | CO1 | An | 15 |
|  | b. | Give a clear picture about the contact lens materials in vivo measurements. | CO2 | U | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Write in detail about slit lamp biomicroscopy illumination techniques. | CO6 | R | 10 |
|  | b. | Discuss the optics of contact lenses with neat diagram. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Enlist the indications of contact lenses. | CO2 | R | 10 |
|  | b. | Give a clear outline on the procedure that is involved in BC measurement in keratometry. | CO6 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe the contra-indications of contact lenses. | CO2 | A | 10 |
|  | b. | Give the differences between continuous wear and extended wear contact lenses. | CO3 | An | 10 |
|  |  |  |  |  |  |
| 5. |  | Write down the philosophy of soft contact lens fitting and assessment. | CO5 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Elaborate on the contact lens fitting procedures that are involved in keratoconus. | CO4 | A | 20 |
|  |  |  |  |  |  |
| 7. |  | Discuss the soft toric contact lens fitting and assessment in detail. | CO4 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Mention about the fitting techniques of contact lens related to children. | CO4 | A | 15 |
|  | b. | Provide a short note on bandage contact lens. | CO3 | U | 5 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | How do you instruct wearers about contact lens care and maintenance? Explain. | CO5 | A | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the history and basics of contact lenses. |
| CO2 | List the important properties of contact lenses. |
| CO3 | Predict the contact lens design for various kinds of patients. |
| CO4 | Recognize various type of contact lens fitting |
| CO5 | Hypothesize the contact lens care procedures for the awareness of the patients |
| CO6 | Demonstrate the instrumentation in contact lens practices. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 10 | - | 15 | - | - | 25 |
| CO2 | 10 | 5 | 10 | - | - | - | 25 |
| CO3 | - | 5 | - | 10 | - | - | 15 |
| CO4 | - | - | 35 | 20 | - | - | 55 |
| CO5 | 20 | - | 20 | - | - | - | 40 |
| CO6 | 10 | - | - | 10 | - | - | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20OP2035** | **Duration** | **3hrs** |
| **Course Name** | **OCCUPATIONAL OPTOMETRY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain about how the International World Health Organization (WHO) is structured. | CO1 | A | 15 |
|  | b. | What is the role of National Safety Council? | CO1 | An | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain an extensive overview of the International Labour Organization (ILO). | CO1 | E | 15 |
|  | b. | Describe the role that safety and hygiene have in occupational health. | CO1 | C | 5 |
|  |  |  |  |  |  |
| 3. |  | Describe the ESI act and its benefits to employees in detail. | CO2 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Describe the ailments that are brought on by chemical and physical factors at work. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 5. |  | Discuss thoroughly about illumination standards and measurements in a workplace. | CO3 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Describe occupational safety in detailing with all aspects of physical, mental, social and safety in a workplace. | CO3 | R | 20 |
|  |  |  |  |  |  |
| 7. | a. | Explain the effects of non-ionizing electromagnetic radiation with special reference to Infrared and Ultraviolet radiations. | CO4 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the prevention of occupational diseases caused by metals and chemical agents. | CO5 | A | 10 |
|  | b. | Describe about the medical surveillance including pre-assignment, periodical medical examinations and medical monitoring. | CO5 | E | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe how to choose and use face shields, Googles, and other tools for occupational employment. | CO6 | A | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the occupational health. |
| CO2 | Identify the visual requirements in various jobs. |
| CO3 | Illustrate the effects of Physical, chemical and biological hazards on eye and vision. |
| CO4 | Analyze occupational causes of visual and eye problems. |
| CO5 | Prescribe suitable corrective lenses and eye protective wear to the patients |
| CO6 | Formulate visual requirements and standards for different jobs. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  |  | 15 | 5 | 15 | 5 | 40 |
| CO2 | 20 | 20 |  |  |  |  | 40 |
| CO3 | 20 | 20 |  |  |  |  | 40 |
| CO4 |  |  |  | 20 |  |  | 20 |
| CO5 |  |  | 10 |  | 10 |  | 20 |
| CO6 |  |  | 20 |  |  |  | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20OP2036** | **Duration** | **3hrs** |
| **Course Name** | **SYSTEMIC DISEASES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe hypertension and its symptoms in detail. | CO1 | R | 6 |
|  | b. | Illustrate diabetes mellitus and its various types. Also discuss the clinical features and its diagnosis procedures in detail. | CO1 | A | 14 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss the factors affecting the blood pressure and its effects in human body. | CO1 | U | 6 |
|  | b. | Explain diabetes retinopathy, its types, clinical features, and management of DR. | CO1 | A | 14 |
|  |  |  |  |  |  |
| 3. | a. | Compare and contrast rheumatoid arthritis and osteoarthritis. | CO2 | R | 6 |
|  | b. | Illustrate the acquired heart disease, types, symptoms and treatment procedures in detail. | CO2 | A | 14 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain rheumatic fever and its effects in human body. | CO2 | U | 6 |
|  | b. | Illustrate the properties of cancer cells and its types in detail. Also discuss the causes and treatment procedures of cancer with adequate examples. | CO2 | An | 14 |
|  |  |  |  |  |  |
| 5. | a. | Describe the functions of thyroid gland and state its various symptoms in body. | CO3 | U | 6 |
|  | b. | Explain the eye and connective tissue diseases in detail. Also discuss various ways to overcome. | CO3 | An | 14 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the causes and symptoms of pulmonary tuberculosis. | CO4 | R | 6 |
|  | b. | Illustrate the types, causes, and diagnosis and treatment procedures of tuberculosis in detail. | CO4 | A | 14 |
|  |  |  |  |  |  |
| 7. | a. | Explain the types, causes, symptoms, principles of diagnosis and management of Schistosomiasis in detail with appropriate diagram. | CO4 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe the components of the immune system in brief. | CO5 | R | 6 |
|  | b. | Analyze the effects of protein energy malnutrition, lack of minerals and vitamins in the immune system of human body. | CO5 | An | 14 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Interpret neurological disorders of human body in detail. | CO6 | A | 6 |
|  | b. | Explain disseminated sclerosis and sub-acute combined degeneration in detail and discuss its effects on human body. | CO6 | An | 14 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Describe the common systematic conditions. |
| CO2 | Classify the various systematic diseases and the respective clinical examinations. |
| CO3 | Perform the clinical diagnosis of diverse systematic diseases. |
| CO4 | Acquaint with the first aid knowledge and management options |
| CO5 | Analyse the Ocular findings of the systematic conditions. |
| CO6 | Design the report on malnutrition and immunology |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 6 | 6 | 14 | 14 |  |  | 40 |
| CO2 | 6 | 6 | 14 | 14 |  |  | 40 |
| CO3 |  | 6 |  | 14 |  |  | 20 |
| CO4 | 6 |  | 14 | 20 |  |  | 40 |
| CO5 | 6 |  |  | 14 |  |  | 20 |
| CO6 |  |  | 6 | 14 |  |  | 20 |
|  | | | | | | | **180** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20PH1001** | **Duration** | **3hrs** |
| **Course Name** | **ELEMENTS OF PHYSICS IN AVIATION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define reflection. | | CO1 | R | 1 |
| 2. | Define spontaneous emission. | | CO1 | R | 1 |
| 3. | Define Gauss’s Law. | | CO2 | R | 1 |
| 4. | Define magnetic field. | | CO2 | R | 1 |
| 5. | Define absorption. | | CO3 | R | 1 |
| 6. | Define dual nature of matter. | | CO3 | R | 1 |
| 7. | Define acoustics. | | CO4 | R | 1 |
| 8. | Define wave interference. | | CO4 | R | 1 |
| 9. | Define Bernoulli’s principle. | | CO5 | R | 1 |
| 10. | Define absolute pressure. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Explain mirrors and lenses. | | CO1 | A | 3 |
| 12. | Describe Electric charge and electric field. | | CO2 | U | 3 |
| 13. | Explain Scanning Electron Microscope. | | CO3 | A | 3 |
| 14. | Explain Lenz’s Law. | | CO4 | A | 3 |
| 15. | Explain the different types of mechanical waves. | | CO5 | U | 3 |
| 16. | Explain Archimedes Principle. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Explain in detail about the working principle and properties of Laser. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Explain in detail about Laser welding and Cutting and its application in aerospace industry. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | Explain electromagnetism and describe the sources of magnetic field. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 20. |  | Explain X-Ray diffraction analysis and Differential thermal analysis in detail. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 21. |  | Explain the following:   1. Faraday’s Law of Induction 2. Eddy Currents and magnetic damping 3. Induced emf and magnetic flux | CO4 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Explain periodic waves and mathematical description of a wave. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 23. |  | Explain the cohesion and adhesion in liquids and describe the capillary action pressures in the body. | CO6 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Explain in detail about the general applications of Bernoulli’s equation. | CO6 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Compare the laws of optics with regards to reflection, refraction, interference, diffraction and polarization. |
| CO2 | Explain various laws governing oscillations and waves. |
| CO3 | Appraise the characterization ability of analytical instruments |
| CO4 | Describe the interplanetary travel in solar system |
| CO5 | Describe the characteristics of acoustic waves |
| CO6 | Demonstrate the process of obtaining nanomaterial and its applications. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 12 | 15 | - | - | - | 29 |
| CO2 | 2 | 15 | - | 3 | - | - | 17 |
| CO3 | 2 | - | 3 | 12 | - | - | 17 |
| CO4 | 2 | 12 | 3 | - | - | - | 17 |
| CO5 | 1 | 3 | 12 | - | - | - | 16 |
| CO6 | 1 | 15 | 12 | - | - | - | 28 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20PH1011** | **Duration** | **3hrs** |
| **Course Name** | **PHYSICAL ELECTRONICS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define the phenomenon of a phonon. | | CO1 | R | 1 |
| 2. | Sketch the energy band diagram of an insulator. | | CO1 | A | 1 |
| 3. | Give an example of pentavalent impurity. | | CO2 | U | 1 |
| 4. | Identify a trivalent dopant which is added to a pure semiconductor to get p-type semiconductor. | | CO2 | U | 1 |
| 5. | Predict the number of transducers used in the flaw detection transmission technique. | | CO3 | U | 1 |
| 6. | List any two field effect transistors. | | CO3 | R | 1 |
| 7. | State Weber-Fechner Law. | | CO4 | R | 1 |
| 8. | Define Loudness. | | CO4 | R | 1 |
| 9. | Indicate the principle behind the ultrasonic flaw detector. | | CO5 | U | 1 |
| 10. | Give examples for conventional energy sources. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Compare Zener Breakdown with Avalanche Breakdown. | | CO1 | U | 3 |
| 12. | Write any three applications of PN junction diode. | | CO2 | A | 3 |
| 13. | Ultrasonics interferometer-based system is used to measure the velocity of ultrasonic waves in the sea. The distance between the two anti-nodes is found to be 0. 4mm. Calculate the velocity of the waves in the sea water. Frequency of the wave generated by the crystal is 1.5MHz. | | CO3 | A | 3 |
| 14. | Interpret the characteristics of musical sound. | | CO4 | U | 3 |
| 15. | Describe the basic principle of acoustic grating. | | CO5 | U | 3 |
| 16. | Classify the types of tides based on tidal range. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Explain how charge density changes with time and distance in a semiconductor, and derive the continuity equation for an n-type semiconductor. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. |  | Describe the formation of PN junction and illustrate the movement of charges in forward bias and reverse bias conditions. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Develop a detailed diagram of the MOS capacitor structure and explain how it works. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. | a. | Analyze the various factors affecting acoustics of an auditorium and suggest the remedial measures for overcoming the same. | CO4 | An | 8 |
|  | b. | A conference room has a total volume of 7000 m3. The magnitude of total absorption within the conference room is 888 sabine. Calculate the reverberation time. | CO4 | A | 4 |
|  |  |  |  |  |  |
| 21. |  | Explain the applications of Non-Destructive Testing of Materials with ultrasonics. Also, Compare the destructive and non-destructive testing. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 22. |  | Discuss the Schottky Diode in detail and explain the diode's operation using a neat diagram. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Determine the Acoustic Characteristics of Musical Sounds and explain how sound is classified in acoustics. | CO4 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Explain the essential components of wind energy and how wind energy conversion systems work. | CO6 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Remember the fundamentals of semiconducting physics. |
| **CO2** | Understand the principle and operation of semiconductor junctions. |
| **CO3** | Demonstrate the MOS structures. |
| **CO4** | Analyze the application of acoustics in construction and acoustic design. |
| **CO5** | Ability to explore the application of ultrasonics in various fields. |
| **CO6** | Understand about the renewable energy sources and devices. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 3 | 13 | - | - | - | 17 |
| **CO2** | - | 26 | 3 | - | - | - | 29 |
| **CO3** | 1 | 1 | 15 | - | - | - | 17 |
| **CO4** | 2 | 3 | 16 | 8 | - | - | 29 |
| **CO5** | - | 4 | - | 12 | - | - | 16 |
| **CO6** | - | 16 | - | - | - | - | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20PH1015** | **Duration** | **3hrs** |
| **Course Name** | **PHYSICS FOR ROBOTICS ENGINEERS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | According to \_\_\_\_\_\_\_\_\_\_\_, the total momentum of a system will stay the same before and after a collision. | | CO1 | U | 1 |
| 2. | \_\_\_\_\_\_\_\_\_ is a term that refers to the moment when a gun moves backwards after it is shot. | | CO1 | R | 1 |
| 3. | Mention any two types of strain. | | CO2 | An | 1 |
| 4. | \_\_\_\_\_\_\_ is defined as the ratio of lateral strain to longitudinal strain. | | CO2 | A | 1 |
| 5. | Give an example for a rigid body. | | CO3 | R | 1 |
| 6. | The number of oscillations per unit time is called \_\_\_\_\_\_\_. | | CO4 | U | 1 |
| 7. | The energy (E) of a photon is equal to \_\_\_\_\_\_\_. | | CO5 | An | 1 |
| 8. | Give an example of a gas laser. | | CO5 | R | 1 |
| 9. | Define total internal reflection. | | CO6 | U | 1 |
| 10. | Only one mode of propagation is possible in a single mode fibre cable. (True/False) | | CO6 | An | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | A body of 2Kg is moving at a velocity of 50m/s. A force starts acting on it and the velocity becomes 20m/s in a time of 5 seconds. Find the force applied to the body. | | CO1 | An | 3 |
| 12. | Write short notes on Young’s modulus. | | CO2 | U | 3 |
| 13. | Differentiate rectilinear and curvilinear translatory motion. | | CO3 | An | 3 |
| 14. | Briefly write about damped harmonic motion. | | CO4 | U | 3 |
| 15. | Mention any three differences between holography and photography. | | CO5 | U | 3 |
| 16. | Give a pictorial representation of an optical fibre. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | State work energy theorem. Derive the expression relating work done and change in kinetic energy. | CO1 | A | 10 |
|  | b. | A body starts from rest with a uniform acceleration of 2 m/s2. Calculate the distance travelled by the body in 2s. | CO1 | An | 2 |
|  |  |  |  |  |  |
| 18. | a. | Draw the stress-strain graph and explain how it is used to measure the strength and elasticity of a material. | CO2 | An | 10 |
|  | b. | State Hooke’s law. | CO2 | R | 2 |
|  |  |  |  |  |  |
| 19. | a. | Derive the equation of motion of a simple pendulum with necessary diagrams. | CO4 | A | 10 |
|  | b. | Define periodic motion. | CO4 | R | 2 |
|  |  |  |  |  |  |
| 20. | a. | List the properties of laser and discuss them with suitable diagram. | CO5 | U | 8 |
|  | b. | Draw the basic components necessary for laser production. | CO5 | R | 4 |
|  |  |  |  |  |  |
| 21. | a. | Give a detailed account on the working of Nd-YAG laser with necessary diagram. | CO5 | An | 10 |
|  | b. | Write short notes on stimulated emission. | CO5 | U | 2 |
|  |  |  |  |  |  |
| 22. | a. | With neat diagram, classify optical fibres based on single and multi mode. | CO6 | U | 10 |
|  | b. | Discuss in short about bending loss. | CO6 | R | 2 |
|  |  |  |  |  |  |
| 23. | a. | Explain the application of the optical fibre cable in the following,   1. Fibre optic communication (ii) Endoscope | CO6 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Give a detailed report on rigid body and its motion with examples. | CO3 | An | 10 |
|  | b. | State Euler’s second law. | CO3 | U | 2 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Apply Newtonian Mechanics to solve problems. |
| CO2 | Demonstrate the ability to solve the problems based on the modulus of elasticity. |
| CO3 | Analyze rigid body mechanics using transformations. |
| CO4 | Apply the fundamentals laws concerning Oscillations. |
| CO5 | Discuss the concepts of lasers and their applications. |
| CO6 | Relate the application of fiber optics in optic devices |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | 1 | 10 | 5 | - | - | 17 |
| CO2 | 2 | 3 | 1 | 11 | - | - | 17 |
| CO3 | 1 | 2 | - | 13 | - | - | 16 |
| CO4 | 2 | 4 | 10 | - | - | - | 16 |
| CO5 | 5 | 13 | - | 11 | - | - | 29 |
| CO6 | 5 | 11 | 12 | 1 | - | - | 29 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20PH1017** | **Duration** | **3hrs** |
| **Course Name** | **APPLIED PHYSICS FOR BIOTECHNOLOGY ENGINEERING** | **Max. Marks** | **100** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | |
| 1. | Populating more number of atoms in the excited state than in the ground state using xenon flash lamp is called ……………. pumping. | | | CO1 | U | 1 |
| 2. | In laser, combination of 100% reflecting mirror and less than 100% partially reflecting mirror is called …………cavity | | | CO1 | R | 1 |
| 3. | Propagation in optical fiber is classified as ……… ray and …… ray. | | | CO2 | R | 1 |
| 4. | The principle of optical fiber is …………… reflection. | | | CO2 | U | 1 |
| 5. | …………….is the medium in which the ultrasound travels with less velocity. | | | CO3 | U | 1 |
| 6. | In magnetostriction oscillator ……….. material is used to produce ultrasound. | | | CO3 | R | 1 |
| 7. | State any two characteristics of musical sound. | | | CO4 | U | 1 |
| 8. | In acoustics the prolongation of a sound wave even after the source is cut off is called as …………….. | | | CO4 | R | 1 |
| 9. | Mention any two examples of ferro magnetic material. | | | CO5 | U | 1 |
| 10. | In superconductivity, ……………… is the effect which is used to levitate train. | | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | |
| 11. | Describe ‘spontaneous absorption’ and ‘stimulated emission’ in lasers. | | | CO1 | An | 3 |
| 12. | Calculate the numerical aperture of a fiber with refractive indices used as n1 = 1.72 and n2 = 1.63 | | | CO2 | U | 3 |
| 13. | Define Magnetostriction effect in ultrasonics with an example. | | | CO3 | An | 3 |
| 14. | Define reverberation time in acoustics. | | | CO4 | U | 3 |
| 15. | Explain the term ‘Bhor Magneton’ and its value in magnetism. | | | CO5 | An | 3 |
| 16. | Describe the principle of ‘superconductivity’ and mention its various types. | | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No 17 to 23, Q.No 24 is Compulsory)** | | | | | | |
| 17. |  | | Appraise the concept and deduce an equation to prove the existence of stimulated emission in lasers using Einstein’s quantum theory of radiation. | CO1 | E | 12 |
|  |  | |  |  |  |  |
| 18. | a. | | Describe the structure of optical fiber in brief. | CO2 | U | 4 |
|  | b. | | Illustrate the types of optical fiber based on material, mode and refractive index with mention to its advantages and applications. | CO2 | A | 8 |
|  |  | |  |  |  |  |
| 19. |  | | Explain the construction and working of a magnetostriction oscillator in the production of ultrasonic waves with necessary circuit diagram. | CO3 | An | 12 |
|  |  | |  |  |  |  |
| 20. | a. | | Compare and contrast the terms ‘intensity’ and ‘loudness’ in acoustics. | CO4 | U | 4 |
|  | b. | | Assess the various factors affecting the architectural acoustics of a building in detail and discuss its remedies to overcome. | CO4 | E | 8 |
|  |  | |  |  |  |  |
| 21. |  | | Explain the hysteresis curve in detail by plotting a model graph between magnetic flux density and the magnetizing field strength. | CO5 | An | 12 |
|  |  | |  |  |  |  |
| 22. | a. | | Calculate the fundamental frequency of vibration when a quartz crystal with density 2650 kg/m3, thickness 0.30 cm is vibrating in resonance. Given that Young’s modulus of quartz is 8.9 x 1010 Nm-2 | CO3 | A | 4 |
|  | b. | | Distinguish the important properties of dia, para and ferro magnetic materials by tabulating in detail. | CO5 | E | 8 |
|  |  | |  |  |  |  |
| 23. |  | | Explain the construction and working of a piezoelectric oscillator in the production of ultrasonic waves with circuit diagram. | CO3 | A | 12 |
| **COMPULSORY QUESTION** | | | | | | |
| 24. | a. | Report the electrical resistance and magnetic field property in superconductors. | | CO6 | U | 4 |
|  | b. | Explain different types of superconductors in detail with its graphical diagram. | | CO6 | An | 8 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Understand the concept of lasers and apply laser action in biotechnology related industries. | | | | | | | |
| CO2 | Explain and interpret the principle of fiber optics for biochemical processes monitoring drug design. | | | | | | | |
| CO3 | Apply non-destructive testing techniques in activation of enzymes and various other processes in  biotechnology industry. | | | | | | | |
| CO4 | Discern the laws governing acoustics and implement the same in synthetic biology and understand bioacoustics and plant acoustics. | | | | | | | |
| CO5 | Evaluate and perceive various laws governing magnetism with special reference to magnetic  separation of heavy minerals and magnetic drug delivery. | | | | | | | |
| CO6 | Create novel industrial and medical imaging applications by applying the principles of  superconducting materials. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| CO / BL | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 1 | 1 |  | 3 | 12 |  | 17 |
| CO2 | | 1 | 8 | 8 |  |  |  | 17 |
| CO3 | | 1 | 1 | 16 | 15 |  |  | 33 |
| CO4 | | 1 | 8 |  |  | 8 |  | 17 |
| CO5 | |  | 1 |  | 15 | 8 |  | 24 |
| CO6 | |  | 8 |  | 8 |  |  | 16 |
|  | | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20PH1018** | **Duration** | **3hrs** |
| **Course Name** | **APPLIED PHYSICS FOR FOOD PROCESS OPERATIONS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Point out one of the advantages of laser cutting in the food industry. | | CO1 | R | 1 |
| 2. | Infer the benefits of laser marking over conventional marking technologies used in the food processing industry. | | CO1 | U | 1 |
| 3. | List any two uses of optical fiber biosensors in the food processing industry. | | CO2 | R | 1 |
| 4. | Mention any two inconveniences caused by conventional monitoring of food quality assurance methods. | | CO2 | U | 1 |
| 5. | Expand the acronym NDT which is a versatile tool in the food processing industry. | | CO3 | R | 1 |
| 6. | Name the measurable features that are monitored by ultrasonic based inspection techniques. | | CO3 | U | 1 |
| 7. | State the reasons that affects firmness index which is the key factor in deciding the ripening acceptance of fruit and can be found by acoustical analysis. | | CO4 | R | 1 |
| 8. | Identify some of the products that have been tested successfully in the recent years using probes that are based on sound waves. | | CO4 | U | 1 |
| 9. | Write the harmful effects of metal contaminants in the packaged food industry. | | CO5 | R | 1 |
| 10. | Identify the sources of metal contaminants in food items. | | CO5 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Determine the band gap energy of the semiconductor laser with an emission wavelength of 546.1 nm. | | CO1 | U | 3 |
| 12. | Determine the numerical aperture of a step-index single-mode optical fiber cable given that the core has a refractive index of 1.543 and the cladding has a refractive index of 1.432. | | CO2 | A | 3 |
| 13. | Calculate the first excited frequency of a pure nickel rod measuring 40 mm in length, with a density of approximately 8900 kg/m3 and a Young's modulus of about 200 GPa. | | CO3 | U | 3 |
| 14. | Determine the intensity level of a chainsaw with an intensity of 100 W/m², considering that the standard intensity level is typically 10-12 W/m². | | CO4 | A | 3 |
| 15. | Find the permeability when a magnetic field of 2400 amperes per meter results in a magnetic flux density of 2 Weber per square meter. | | CO5 | U | 3 |
| 16. | Apply fundamental principles to calculate the isotopic mass of a metal when the critical temperature drops from 4.185 K to 4.133 K, given its initial isotopic mass of 199.5. | | CO6 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Apply Einstein's quantum theory of radiation to demonstrate the presence of stimulated emission of radiation. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. |  | Deduce a correlation between the numerical aperture and the acceptance angle of an optical fiber cable, with an appropriate diagram. | CO2 | An | 12 |
|  |  |  |  |  |  |
| 19. |  | Describe how to generate ultrasonic waves utilizing the inverse piezoelectric effect, accompanied by a circuit diagram. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Examine and assess four key factors influencing the acoustic quality of an auditorium, while also proposing corresponding corrective actions. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. |  | Differentiate and highlight the distinctions and similarities among diamagnetic, paramagnetic, and ferromagnetic materials. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 22. | a. | Enumerate the techniques for attaining population inversion and provide an in-depth explanation of one of these methods. | CO1 | R | 6 |
|  | b. | Differentiate graded index and step index optical fiber cables. | CO2 | R | 6 |
|  |  |  |  |  |  |
| 23. | a. | Provide concise explanations for the following phenomena:   * Magnetostriction effect * Piezoelectric effect | CO3 | U | 6 |
|  | b. | Distinguish musical sounds from noises using a tabular comparison. | CO4 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Elaborate on the classification of superconductors, which are categorized into two distinct groups, providing a comprehensive explanation. | CO6 | E | 6 |
|  | b. | Contrast the behavior of a normal conducting material and a superconducting material in the presence of an external magnetic field. | CO6 | E | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the concept of lasers and apply laser action in food processing industries. |
| CO2 | Explain and interpret the principle of fiber optics for food quality and safety assessment. |
| CO3 | Apply non-destructive testing techniques in agro-food products. |
| CO4 | Discern the laws governing acoustics and implement the same in creating better environment for workers in food industries. |
| CO5 | Evaluate and perceive various laws governing magnetism with special reference to magnetic separation of contaminants in food industries. |
| CO6 | Create efficient industrial applications by applying the principles of superconducting materials. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 7 | 4 | 12 | --- | --- | --- | **23** |
| **CO2** | 7 | 1 | 3 | 12 | --- | --- | **23** |
| **CO3** | 1 | 10 | 12 | --- | --- | --- | **23** |
| **CO4** | 1 | 7 | 3 | 12 | --- | --- | **23** |
| **CO5** | 1 | 4 | --- | 12 | --- | --- | **17** |
| **CO6** | -- | --- | 3 | --- | 12 | --- | **15** |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20PH1020** | **Duration** | **3hrs** |
| **Course Name** | **APPLICATION OF ENGINEERING MATERIALS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define coordination number. | | CO1 | R | 1 |
| 2. | A material is said to be allotropic, if it has…………. | | CO1 | R | 1 |
| 3. | Mention the features of grains. | | CO2 | U | 1 |
| 4. | List a few examples for plastic deformation. | | CO2 | U | 1 |
| 5. | Draw stress strain curve for ceramics. | | CO3 | R | 1 |
| 6. | Summarize few traditional ceramics with its applications. | | CO3 | R | 1 |
| 7. | …………….. is a good example of a natural composite, combination of cellulose fiber and lignin. | | CO4 | R | 1 |
| 8. | Enumerate a few fibers used in Polymer matrix composites. | | CO4 | U | 1 |
| 9. | ……………..solidus temperature of Lead base alloys. | | CO5 | U | 1 |
| 10. | Infer two types of losses due to corrosion. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Describe with neat sketches the arrangement of atoms in the BCC, FCC lattices. | | CO1 | U | 3 |
| 12. | Define Hook’s law. | | CO2 | R | 3 |
| 13. | Briefly explain the operation of the Frank Reed source of dislocations. | | CO3 | An | 3 |
| 14. | List a few advantages of composites. | | CO4 | U | 3 |
| 15. | Classify various steels with respect to their functions. | | CO5 | An | 3 |
| 16. | List a few factors leading to corrosion. | | CO6 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Classify materials and elaborate on the mechanical properties of materials. | CO1 | An | 12 |
|  |  |  |  |  |  |
| 18. | a. | Explain the defects in crystal with suitable examples. | CO2 | An | 12 |
|  |  |  |  |  |  |
| 19. | a. | Explain the plastic deformation by slip and twinning. | CO3 | An | 6 |
|  | b. | Discuss thermal properties of ceramics. | CO3 | An | 6 |
|  |  |  |  |  |  |
| 20. | a. | Classify the composite materials with examples. | CO4 | A | 6 |
|  | b. | Illustrate the fabrication process for fiber reinforced metal matrix composites With neat sketches. | CO4 | A | 6 |
|  |  |  |  |  |  |
| 21. | a. | Explain in detail the properties of high temperature tools employed in fabrication. | CO5 | An | 6 |
|  | b. | Appraise the various characteristics of tool materials. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 22. | a. | Elaborate on the tensile testing with neat sketches. | CO2 | A | 6 |
|  | b. | Appraise the characteristics of nickel alloys and their working principle. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 23. | a. | Compare and contrast IZOD and Charpy Impact test. | CO3 | An | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Compare and contrast Wet and dry corrosion with suitable case studies. | CO6 | An | 6 |
|  | b. | Appraise any one method of protection from corrosion. | CO6 | An | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Apply the concepts of materials science for material selections towards new product development. |
| CO2 | Evaluate behavior of metal/alloys for engineering applications. |
| CO3 | Suggest the modern ceramic materials for engineering applications. |
| CO4 | Synthesize and develop the unique customized composites for aerospace applications. |
| CO5 | Knowledge on bearing, cutting and refractory metals for special engineering applications |
| CO6 | Develop the corrosion resistance materials for marine applications |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 3 |  | 14 |  |  | 19 |
| CO2 |  | 5 | 12 | 12 |  |  | 29 |
| CO3 | 2 |  |  | 15 |  |  | 17 |
| CO4 | 1 | 5 | 12 |  |  |  | 18 |
| CO5 |  | 4 | 12 | 9 |  |  | 25 |
| CO6 |  | 1 | 3 | 12 |  |  | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20PH3016** | **Duration** | **3hrs** |
| **Course Name** | **QUANTUM COMPUTING IN AI** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Mention any five differences between classical and quantum computers. | CO1 | U | 10 |
|  | b. | Give a clear outline on the operator formalism in quantum mechanics. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | The state of a qubit can be represented by a Bloch sphere. Validate. | CO1 | U | 10 |
|  | b. | No physical theory of local hidden variables can ever reproduce all of the predictions of quantum mechanics. Validate the statement. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Give an account on the density matrices and its application to quantum computers. | CO2 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Quantum Fourier transform is the classical discrete Fourier transform applied to the vector of amplitudes of a quantum state. Explain the statement. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 5. | a. | One controlled-Z gate and two Hadamard gates can be used to construct a CNOT gate. Validate the statement. | CO3 | A | 10 |
|  | b. | Prove the following identities: HXH=Z and HZH=X, where H, X, and Z are Hadamard, X and Z gates. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain how Grover's algorithm can be used to solve unstructured search problems. | CO4 | A | 10 |
|  | b. | Describe the Deutsch's algorithm that is used to solve specific problem using quantum concepts. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe in detail about quantum noise and quantum operations. | CO5 | U | 10 |
|  | b. | Discuss the significance in understanding the error and corrections involved in quantum computing. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Illustrate how von Neumann architecture is used to solve different tasks of a quantum computer, like computation or storage. | CO5 | An | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss how quantum approaches can be applied to basic methods / algorithms that are associated with data processing and machine learning procedure. | CO6 | An | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the scientific background such as Hilbert space, tensors and operators behind quantum computing |
| CO2 | Distinguish between various quantum circuits that are involved in the field of quantum computing |
| CO3 | Classify different quantum algorithms and discuss the relation between quantum and classical complexity |
| CO4 | Appraise on the theory of quantum information, quantum error and correction |
| CO5 | Validate on the inter relation between quantum theory and artificial intelligence through applications |
| CO6 | Understand the scientific background such as Hilbert space, tensors and operators behind quantum computing |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 30 |  | - | - | - | 40 |
| CO2 | - | 20 | 20 | - | - | - | 40 |
| CO3 | - | - | 20 | - | - | - | 20 |
| CO4 | - | - | 20 | - | - | - | 20 |
| CO5 | - | 10 | 10 | 20 | - | - | 40 |
| CO6 | - | - | - | 20 | - | - | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **22PH3001** | **Duration** | **3hrs** |
| **Course Name** | **SOLID STATE IONICS AND ENERGY DEVICES** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe the role of glass transition temperature (Tg) in determining the polymer membrane flexibility. | CO1 | U | 5 |
|  | b. | Explain the characteristics of miscible and immiscible polymer blends based on glass transition temperature. | CO1 | An | 10 |
|  | c. | Determine the properties of polymer blends and mention their role in energy devices. | CO1 | A | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe steps involved in solution casting method for making of polymer membranes with required diagram. | CO1 | R | 5 |
|  | b. | Compare the characteristics of diamond and graphite structure. | CO1 | An | 10 |
|  | c. | Discuss the properties of carbon nanotubes and its types. | CO1 | U | 5 |
|  |  |  |  |  |  |
| 3. | a. | List any five properties of beta alumina. | CO2 | A | 5 |
|  | b. | Compare fast ion conductors and superionic conductors. | CO2 | U | 10 |
|  | c. | Interpret the role of ionic and mixed conductors in battery materials. | CO2 | U | 5 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | List any four types of polymer electrolytes to be used in energy devices. | CO2 | R | 5 |
|  | b. | Explain the properties of LISICON and NASICON as a superionic conductor and its mechanism of ion transport. | CO2 | U | 10 |
|  | c. | Write a short note on fillers and plasticizers used in polymer electrolytes. | CO2 | A | 5 |
|  |  |  |  |  |  |
| 5. | a. | Describe the role of impedance spectra in real systems. | CO3 | R | 5 |
|  | b. | Explain the conditions necessary for impedance spectroscopy measurements with necessary equations. | CO3 | An | 10 |
|  | c. | Analyze the reason for depressed semicircles in a Nyquist plot. | CO3 | U | 5 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Define impedance with examples. | CO3 | R | 5 |
|  | b. | Determine the impedance spectra of model electrolyte systems sandwiched between (i) blocking and (ii) non-blocking electrodes. | CO3 | A | 10 |
|  | c. | Trace the impedance plot in case of R and C connected in series. | CO3 | U | 5 |
|  |  |  |  |  |  |
| 7. | a. | List the applications of EDLC. | CO4 | R | 5 |
|  | b. | Explain the role of pseudo capacitive materials in enhancing the efficiency of a supercapacitor. | CO4 | A | 10 |
|  | c. | Compare 1 D, 2D and 3 D nanostructures with examples. | CO4 | U | 5 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe the electrical properties of quantum dots. | CO4 | R | 5 |
|  | b. | Discuss the working principle of lithium ion battery with a neat schematic diagram. | CO4 | U | 10 |
|  | c. | Compare symmetric and asymmetric supercapacitors with examples. | CO4 | An | 5 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Define non-faradaic process. | CO5 | R | 5 |
|  | b. | Illustrate the role of cyclic voltammetry technique in determining the redox behavior of electrode materials in any of the energy devices. | CO5 | U | 10 |
|  | c. | Describe the role of GCD in battery analysis. | CO6 | R | 5 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the types of materials based on structure. |
| CO2 | Understand the electrical properties of mixed and ionically conducting materials. |
| CO3 | Analyse the electrical and electrochemical properties of materials. |
| CO4 | Apply the knowledge of materials for making energy devices. |
| CO5 | Evaluate the energy storage devices. |
| CO6 | Create alternative energy storage devices to existing once. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 5 | 10 | 5 | 20 |  |  | 40 |
| CO2 | 5 | 25 | 10 |  |  |  | 40 |
| CO3 | 10 | 10 | 10 | 10 |  |  | 40 |
| CO4 | 10 | 15 | 10 | 5 |  |  | 40 |
| CO5 | 5 | 10 |  |  |  |  | 15 |
| CO6 | 5 |  |  |  |  |  | 5 |
|  | | | | | | | **180** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23PH1001** | **Duration** | **3hrs** |
| **Course Name** | **APPLIED PHYSICS FOR AEROSPACE ENGINEERING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define LASER. | | CO1 | R | 1 |
| 2. | List the different types of LASER. | | CO1 | R | 1 |
| 3. | Define Numerical Aperture. | | CO2 | R | 1 |
| 4. | Define Acceptance Angle. | | CO2 | R | 1 |
| 5. | List the characteristics of musical sound. | | CO3 | R | 1 |
| 6. | List the different classification of Sound. | | CO3 | R | 1 |
| 7. | Define the frequency range of ultrasonic waves. | | CO4 | R | 1 |
| 8. | List the properties of ultrasonic waves. | | CO4 | R | 1 |
| 9. | Define Langevin’s Theory of Magnetism. | | CO5 | R | 1 |
| 10. | State Kepler’s first law of planetary motion. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Explain the Principle and Properties of Laser. | | CO1 | A | 3 |
| 12. | Describe Avionics Communication Systems in detail. | | CO2 | U | 3 |
| 13. | Explain Room Acoustics. | | CO3 | A | 3 |
| 14. | Explain Ultrasonic Testing of Aerospace Composites. | | CO4 | A | 3 |
| 15. | Explain the different types of Magnetic Materials. | | CO5 | U | 3 |
| 16. | Explain Space Station and its applications. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Explain in detail about Laser Enabled Additive Manufacturing for Space Exploration. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Explain in detail about applications of Laser in Aerospace Industry. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | Explain the Propagation of Light in Optical Fibers and its use in aircraft’s avionics communication system. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 20. |  | Explain Reverberation Time and derive it using Sabine’s Formula. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 21. |  | Explain the Aerospace Industry applications of Ultrasonic Testing. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Explain the use of Cryogenic Magnets in Space applications. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 23. |  | Explain the arrangement of our solar system in space with a neat sketch. | CO6 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Explain in detail about Interplanetary Space Travel. | CO6 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the basic working principle of lasers and apply the same in novel applications in the aerospace industry. |
| CO2 | Construct applications based on optical fiber technology in evaluating aeronautical systems. |
| CO3 | Investigate the structural integrity of materials using acoustical phenomena. |
| CO4 | Apply the non-destructive testing methods using ultrasound waves for testing various components in the aerospace industry. |
| CO5 | Analyze the importance of novel magnetic materials and their applications in sensors and actuators used in aerospace systems. |
| CO6 | Distinguish between the various solar system models, earth’s immediate cosmic neighborhood, and other constituents of the solar system. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 12 | 15 | - | - | - | 29 |
| CO2 | 2 | 15 | - | 3 | - | - | 17 |
| CO3 | 2 | - | 3 | 12 | - | - | 17 |
| CO4 | 2 | 12 | 3 | - | - | - | 17 |
| CO5 | 1 | 3 | 12 | - | - | - | 16 |
| CO6 | 1 | 15 | 12 | - | - | - | 28 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23PH2001** | **Duration** | **3hrs** |
| **Course Name** | **NANOMATERIALS AND ENERGY DEVICES** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Mention the quantum state of a Thin film. | | CO1 | U | 1 |
| 2. | State the De Broglie hypothesis. | | CO1 | R | 1 |
| 3. | Blue Shift happens in optical properties due to \_\_\_\_\_\_\_\_. | | CO2 | An | 1 |
| 4. | Aspect ratio is otherwise called as\_\_\_\_\_\_\_\_\_. | | CO2 | A | 1 |
| 5. | Gibs Free energy equation is used to measure \_\_\_\_\_\_\_\_Surface energy of nanomaterials. | | CO2 | U | 1 |
| 6. | Arm chair carbon nanotubes are \_\_\_\_\_\_\_\_conducting | | CO3 | U | 1 |
| 7. | Gold nanoparticles are coated with \_\_\_\_\_\_ chemicals for electronic coupling between them. | | CO3 | An | 1 |
| 8. | Super Para magnetism is exhibited by—————— materials. | | CO3 | An | 1 |
| 9. | High efficiency solar cells utilize \_\_\_\_\_\_ wavelength of the spectrum. | | CO4 | U | 1 |
| 10. | Lithium-ion batteries are \_\_\_\_\_\_\_\_type of batteries. | | CO5 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | State Planks Hypothesis. | | CO1 | R | 3 |
| 12. | Define De-Broglie Wavelength | | CO1 | U | 3 |
| 13. | Deduce electron wave length for the acceleration of 100v electron | | CO2 | An | 3 |
| 14. | Draw the Blue shift and red shift in UV Spectrophotograph | | CO3 | An | 3 |
| 15. | Draw the BH curve and mention the regions of interest for a ferromagnetic material. | | CO3 | An | 3 |
| 16. | Classify different types of carbon nanotubes | | CO4 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Demonstrate the Quantum well, Quantum wire and Quantum dot structures through size reduction. | CO1 | U | 10 |
|  | b. | Define Bohr exciton radius. | CO1 | U | 2 |
| 18. | a. | Compare the density of states for Quantum well, Quantum wire and quantum dot with respect to bulk material. | CO1 | A | 12 |
| 19. | a. | Demonstrate the different colours exhibited by Gold at different sizes. | CO2 | A | 8 |
|  | b. | Analyse the surface to volume ratio of bulk and nano materials | CO2 | A | 4 |
| 20. | a. | Demonstrate the increase in surface area upon size reduction with suitable schematic | CO2 | A | 8 |
|  | b. | Analyze the mechanical properties of nanomaterials to realize the self-purification. | CO2 | An | 4 |
| 21. | a. | Classify carbon nanotubes based on its T vector rotation to exhibit zig zag, arm chair, and chiral types with suitable cross section. | CO3 | An | 12 |
| 22. | a. | Analyze the electrical properties of gold nanoparticles with suitable circuit and the IV plot | CO3 | An | 12 |
| 23. | a. | Demonstrate the working of Solar cells and plot the volt ampere characteristics | CO4 | An | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Demonstrate the charging and discharging of a lithium ion battery with a neat schematic. | CO5 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Classify the quantum states upon size reduction to nanoscale |
| CO2 | Distinguish the physical properties of bulk and nano materials |
| CO3 | Analyse the structural and optical properties of nano materials |
| CO4 | Analyse the magnetic and electrical properties of nanomaterials |
| CO5 | Demonstrate the working of lithium ion battery |
| CO6 | Design super capacitor using nano materials |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 4 | 16 | 12 |  |  |  | 32 |
| **CO2** |  | 1 | 21 | 8 |  |  | 30 |
| **CO3** |  | 1 |  | 32 |  |  | 33 |
| **CO4** |  | 4 |  | 12 |  |  | 16 |
| **CO5** | 1 | 12 |  |  |  |  | 13 |
| **CO6** |  |  |  |  |  |  |  |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23PH3037** | **Duration** | **3hrs** |
| **Course Name** | **RADIATION TREATMENT AND PLANNING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | In the realm of medical treatment, list the vital components of a modern Linear Accelerator (LINAC), and explain how it is applied in the treatment of cancer. | CO1 | A | 15 |
|  | b. | State the operational principles of RF Power Generation Systems used in medical field. | CO1 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Infer the critical principles and components involved in the electronic beam transport process and discuss them in detail. | CO1 | U | 15 |
|  | b. | Analyze beam collimation in particle accelerators, such as Linear Accelerators (LINACs) and cyclotrons, and write how they contribute to beam precision and safety. | CO1 | An | 5 |
|  |  |  |  |  |  |
| 3. | a. | Analyze the relationship between Percentage Depth Dose and Tissue Maximum Ratio and hence, discuss the Clarkson’s method of treatment planning. | CO2 | An | 15 |
|  | b. | Explain Surface Dose and Skin Sparing Effect in brief. | CO2 | A | 5 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Based on the understanding of isodose distribution, explain in detail about factors affecting isodose distribution. | CO2 | U | 15 |
|  | b. | State the importance of inverse square law in radiation treatment and planning. | CO2 | R | 5 |
|  |  |  |  |  |  |
| 5. | a. | Infer the differences between Gross Tumor Volume (GTV), Clinical Target Volume (CTV), and Internal Target Volume (ITV), and determine how these elements are a part of a global Planning Target Volume (PTV) construction. | CO3 | U | 15 |
|  | b. | Explain the importance of Technical Report Series 430 (TRS 430) released by International Atomic Energy Agency (IAEA) in brief. | CO3 | A | 5 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Outline the significance of ICRU (International Commission on Radiation Units and Measurements) 62 report. | CO6 | E | 15 |
|  | b. | Discuss the importance of isodose curves and wedge filters. | CO6 | E | 5 |
|  |  |  |  |  |  |
| 7. | a. | Compare and contrast the differences between Source to Axis Distance (SAD) and Source to Skin Distance (SSD) techniques after explaining their significance. | CO4 | An | 15 |
|  | b. | Draw 6 MeV and 12 MeV electron beam depth dose curves and compare Rmax, R85, R50, and Rp. | CO4 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | List the ways in which electrons interact with the surrounding matter and explain the same in detail. | CO4 | R | 15 |
|  | b. | Apply the principles of radiation shielding and write the ways of shielding of electron beams. | CO4 | A | 5 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the phenomenon of Dose Volume Histogram (DVH). Explain how this concept is used in radiation treatment and planning. | CO5 | A | 15 |
|  | b. | Analyze the significance of 3-Dimensional Conformal Radiotherapy (3-D CRT) for the effective treatment of cancer tissues in brief. | CO5 | An | 5 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Examine the advanced information about radiotherapy machines. |
| CO2 | Distinguish different types of interaction of photon beams with matter. |
| CO3 | Apply various calibration methods to ensure better quality treatment using machines. |
| CO4 | Analyze the various clinical treatment planning. |
| CO5 | Evaluate the various radiation treatment modalities. |
| CO6 | Create better treatment modalities using electron beam therapy and advanced radiotherapy treatment methods like Cyberknife. |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 5 | 15 | 15 | 5 | -- | -- | 40 |
| CO2 | 5 | 15 | 5 | 15 | -- | -- | 40 |
| CO3 | -- | 15 | 5 | -- | -- | -- | 20 |
| CO4 | 20 | -- | 5 | 15 | -- | -- | 40 |
| CO5 | -- | -- | 15 | 5 | -- | -- | 20 |
| CO6 | --- | -- | -- | --- | 20 | -- | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23PH3038** | **Duration** | **3hrs** |
| **Course Name** | **MEDICAL RADIATION DOSIMETRY** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Derive an expression for the binding energy of a nucleus. | CO1 | A | 15 |
|  | b. | List the properties of gamma rays. | CO1 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss in detail the Rutherford-Soddy radiation decay law and arrive at an expression for half-life of a radioactive nucleus. | CO1 | U | 15 |
|  | b. | Compare and contrast ionizing and non-ionizing radiations. | CO1 | An | 5 |
|  |  |  |  |  |  |
| 3. | a. | Derive an expression for Compton Scattering and explain how it is applied to medical radiation field. | CO2 | An | 15 |
|  | b. | List the ways in which photons interact with matter. | CO2 | A | 5 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Discuss in detail the interactions of neutrons wit matters surrounding them. | CO2 | U | 15 |
|  | b. | Write short notes on the inelastic scattering of neutrons. | CO2 | R | 5 |
|  |  |  |  |  |  |
| 5. | a. | Discuss in detail, Burlin and Spencer Attix cavity theory. | CO3 | U | 15 |
|  | b. | Tabulate the definition, formula and units of Flux, particle fluence, energy fluence activity and specific activity. | CO3 | A | 5 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Define linear attenuation coefficient, Half Value Layer (HVL), Tenth Value Layer (TVL), and derive the relation between  (1) µ and HVL.  (2) HVL and TVL. | CO6 | E | 15 |
|  | b. | Write about Bragg Gray cavity theory. | CO6 | E | 5 |
|  |  |  |  |  |  |
| 7. | a. | Explain with neat diagram the working of free air ionization chamber. | CO4 | An | 15 |
|  | b. | Explain in detail about the principle, working of a Thermo-Luminescent Dosimeter (TLD) and its reader with neat diagram | CO4 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe the working of a gas filled detector and neat diagram. | CO4 | R | 15 |
|  | b. | Write short notes on necessity of all correction factors applied for absolute dose absolution dose measurement with ionization chamber. | CO4 | A | 5 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain Geiger-Mueller based survey meter. | CO5 | A | 15 |
|  | b. | Discuss International Atomic Energy Agency’s (IAEA TRS 398) protocol for high energy photon beam calibration. | CO5 | An | 5 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Compare and contrast between an atom and a nucleus and other critical ideas related to them. |
| CO2 | Differentiate between the types of radiation emitted from nuclear sources. |
| CO3 | Apply the interaction of radiation with matter in novel peaceful applications. |
| CO4 | Analyze and understand the various units of radiation measurements. |
| CO5 | Evaluate the different types of radiation detection and measurement. |
| CO6 | Create novel dosimetry systems for measuring different types of nuclear radiation. |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 5 | 15 | 15 | 5 | -- | -- | 40 |
| CO2 | 5 | 15 | 5 | 15 | -- | -- | 40 |
| CO3 | -- | 15 | 5 | -- | -- | -- | 20 |
| CO4 | 20 | -- | 5 | 15 | -- | -- | 40 |
| CO5 | -- | -- | 15 | 5 | -- | -- | 20 |
| CO6 | --- | -- | -- | --- | 20 | -- | 20 |
|  | | | | | | | **180** |