

(7 pages)

Reg. No. :

Code No. : 20602 E Sub. Code : EMPH 41

B.Sc. (CBCS) DEGREE EXAMINATION,
APRIL 2025.

Fourth Semester

Physics — Core

OPTICS AND LASER PHYSICS

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer :

1. The inability of a lens to form a white image of a white object is known as
 - (a) spherical aberration
 - (b) chromatic aberration
 - (c) monochromatic aberration
 - (d) coma

2. Huygen's eyepiece is also known as _____.
- (a) spherical eyepiece
 - (b) positive eyepiece
 - (c) negative eyepiece
 - (d) double eyepiece
3. Which of the following does not show any interference pattern?
- (a) Wedge shaped film
 - (b) Excessively thin film
 - (c) A thick film
 - (d) Soap bubble
4. The shape of the fringes observed in interference is
- (a) straight
 - (b) circular
 - (c) hyperbolic
 - (d) elliptical
5. The zone plate behaves like a
- (a) concave lens with multiple foci
 - (b) convex lens with multiple foci
 - (c) convex lens with single foci
 - (d) concave lens with single foci

6. In a single slit diffraction pattern intensity and width of fringes are
- (a) unequal width
 - (b) equal width
 - (c) equal width and equal intensity
 - (d) unequal width and unequal intensity
7. A plate which induces the desired amount of phase difference between two rays is known as
- (a) polaroid
 - (b) phasor plates
 - (c) quartz plates
 - (d) retardation plates
8. If the phase difference between two rays is $\frac{\pi}{2}$ and the angle of incidence is equal to $\frac{\pi}{4}$ the emergent light is
- (a) Linearly polarized
 - (b) Elliptically polarized
 - (c) Circularly polarized
 - (d) Non polarized

9. An example of optical pumping
- (a) Ruby laser
 - (b) Helium-Neon laser
 - (c) Semiconductor laser
 - (d) Dye laser
10. In the CO_2 molecular gas laser, transition takes place between the
- (a) molecular states
 - (b) atomic states
 - (c) vibrational states
 - (d) energy states

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe about spherical aberration. How can spherical aberration defect be removed?

Or

- (b) Explain construction and working of Huygen's eyepiece.

Page 4 **Code No. : 20602 E**
[P.T.O.]

12. (a) Explain the testing of plainness of a glass surface using air-wedge.

Or

- (b) Describe Michelson interferometer and show how it can be used for measuring the wavelength of any line in a spectrum.

13. (a) What is a zone plate? Explain the theory of construction of a zone plate.

Or

- (b) Explain the resolving power and dispersive power of a grating.

14. (a) Explain the working of a Half wave plate.

Or

- (b) Write about optical activity of a substance and Fresnel's explanation of optical rotation.

15. (a) Explain, with neat diagram absorption, spontaneous emission and stimulated emission of radiation.

Or

- (b) Explain the principle and working of CO₂ laser.

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the methods of minimizing spherical aberration and chromatic aberration.

Or

- (b) Explain refraction through a thin prism.

17. (a) Obtain the path difference and the condition for maxima and minima for thin film interference due to reflected light.

Or

- (b) What are Newton's rings and how are they formed? Explain.

18. (a) Explain the rectilinear propagation of light using Fresnel's assumption.

Or

- (b) Write differences between a zone plate and a convex lens.

19. (a) Give an account of double refraction in uniaxial crystals.

Or

- (b) Explain the production and detection of plane and circularly polarized light.

20. (a) Establish the relation between Einstein's coefficients.

Or

- (b) Explain the principle and working of a He-Ne laser.
-

(6 pages)

Reg. No. :

Code No. : 20611 E

Sub. Code : ESPH 41

**B.Sc. (CBCS) DEGREE EXAMINATION,
APRIL 2025.**

Fourth Semester

Physics

**Skill Enhancement Course — MAINTENANCE OF
ELECTRONIC APPLIANCES**

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer :

1. Solder is essentially a
 - (a) Tin-silver base
 - (b) Tin lead base
 - (c) Tin-zinc base
 - (d) Tin-bismuth base

2. Binding wire used to support the joints for soldering is made of
- (a) Aluminum
 - (b) Copper
 - (c) Soft iron
 - (d) Mild steel
3. Which of the following represent a change of output voltage when load current is increased?
- (a) Line regulation
 - (b) Load regulation
 - (c) Current regulation
 - (d) Voltage regulation
4. Current is converted to voltage _____.
- (a) through a voltmeter
 - (b) through a resistance
 - (c) through an ammeter
 - (d) through a galvanometer
5. The full form of LCD is _____.
- (a) Liquid Crystal Display
 - (b) Liquid Crystalline Display
 - (c) Logical Crystal Display
 - (d) Logical Crystalline Display

6. By making use of a CRO _____.
- (a) many characteristics of a signal can be measured
 - (b) only a few characteristics of a signal can be measured
 - (c) no characteristics of a signal can be measured
 - (d) signal can only be displayed
7. Which of the following is the brain of the computer?
- (a) Central Processing Unit
 - (b) Memory
 - (c) Arithmetic and Logic unit
 - (d) Control unit
8. Which of the following part of a processor contains the hardware necessary to perform all the operations required by a computer?
- (a) Controller
 - (b) Registers
 - (c) Cache
 - (d) Data path

9. A solar cell is a _____.
- (a) P-type semiconductor
 - (b) N-type semiconductor
 - (c) Intrinsic semiconductor
 - (d) P-N Junction
10. A solar cell converts light energy into _____.
- (a) Electrical energy
 - (b) Thermal energy
 - (c) Sound energy
 - (d) Heat energy

PART B — ($5 \times 5 = 25$ marks)

Answer ALL the questions, choosing either (a) or (b).

11. (a) Explain dry solder joint.

Or

- (b) Discuss about the working action of soldering iron.

12. (a) How does a transformer work?

Or

- (b) List out the uses of capacitor and resistor.

Page 4 Code No. : 20611 E

[P.T.O.]

13. (a) Annotate the working principle of LED.

Or

(b) Calculate AC and DC frequency using CRO.

14. (a) Explain about the various parts of a computer.

Or

(b) Explain basic network installation.

15. (a) Explain Overload and Overcharging.

Or

(b) Explain solar battery.

PART C — (5 × 8 = 40 marks)

Answer ALL the questions, choosing either (a) or (b).

16. (a) Describe about the printed circuit board.

Or

(b) Distinguish good and bad solders joints.

17. (a) Describe about the function of integrated circuit 7905.

Or

(b) Discuss about the principle of switch mode power supply with a suitable diagram.

18. (a) Explain about the working action of CCTV camera with a block diagram.

Or

- (b) Describe about the construction and working of cathode ray tube.
19. (a) Describe about the installation of an windows operating system.

Or

- (b) Examine the working principle of MODEM.
20. (a) Analyse the working principle of solar panel.

Or

- (b) Summarize the various faults and its rectification of solar power system.
-

(7 pages)

Reg. No. :

Code No. : 20621 E Sub. Code : EECH 21/
EECH 41/FECH 21

B.Sc. (CBCS) DEGREE EXAMINATION,
APRIL 2025.

Second/Fourth Semester

Chemistry

Elective — CHEMISTRY FOR PHYSICAL
SCIENCES – II

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer :

1. According to Werner's theory, how many types of valencies can a metal exhibit in coordination compounds?
 - (a) One
 - (b) Two
 - (c) Three
 - (d) Four

2. The biological role of hemoglobin primarily involves:
- (a) Oxygen transport
 - (b) Carbon dioxide transport
 - (c) Nitrogen transport
 - (d) Hydrogen transport
3. The open-chain structure of glucose and fructose is characterized by the presence of
- (a) One aldehyde group
 - (b) Two ketone groups
 - (c) Two aldehyde groups
 - (d) One ketone group
4. Which nucleic acid carries genetic information in cells?
- (a) RNA
 - (b) DNA
 - (c) mRNA
 - (d) tRNA

5. Which of the following electrodes is commonly used as a reference electrode in electrochemical measurements?

- (a) Platinum electrode
- (b) Calomel electrode
- (c) Copper electrode
- (d) Graphite electrode

6. Which of the following is a buffer solution?

- (a) Distilled water
- (b) 0.1 M HCl
- (c) A solution of acetic acid and sodium acetate
- (d) 0.1M NaOH

7. What is the order of a reaction if its rate is directly proportional to the concentration of a single reactant?

- | | |
|------------------|-----------------|
| (a) Zero order | (b) First order |
| (c) Second order | (d) Third order |

8. The energy required to initiate a chemical reaction is known as :
- (a) Activation energy
 - (b) Enthalpy
 - (c) Entropy
 - (d) Gibbs free energy
9. Stark-Einstein's law of photochemical equivalence states that :
- (a) Each photon absorbed by a molecule result in the emission of multiple electrons
 - (b) Each molecule absorbs multiple photons to undergo a photochemical reaction
 - (c) Each photon absorbed by a molecule result in the emission of one electron
 - (d) Each photon absorbed by a molecule result in the emission of one photon
10. Phosphorescence is characterized by:
- (a) Immediate emission of light upon absorption of radiation
 - (b) Delayed emission of light after stopping the radiation
 - (c) Emission of light only at specific wavelengths
 - (d) Emission of light with high intensity

PART B — (5 × 5 = 25 marks)

Answer ALL questions, by choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe Werner's theory of coordination compounds.

Or

- (b) Explain the EDTA method for the determination of water hardness.

12. (a) How will you convert glucose into fructose?

Or

- (b) Write a note on RNA.

13. (a) Discuss the principle and applications of a calomel electrode in electrochemistry.

Or

- (b) Write a note on fuel cells.

14. (a) Write a note on half-life period.

Or

- (b) Discuss homogeneous catalysis.

15. (a) Explain Stark-Einstein's law of photochemical equivalence.

Or

- (b) Explain the concept of photosynthesis.

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions, by choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss the application of Pauling's theory to $[\text{Ni}(\text{CO})_4]$, $[\text{Ni}(\text{CN})_4]^{2-}$, and $[\text{Co}(\text{CN})_6]^{3-}$

Or

- (b) Explain the biological role of hemoglobin and chlorophyll.

17. (a) Discuss the preparation and properties of glucose.

Or

- (b) What are amino acids? How are they classified? Discuss the preparation of glycine.

18. (a) Discuss the principle and applications of conductometric titrations.

Or

- (b) Write a note on electroplating.

19. (a) Explain the methods of determining the order of a reaction.

Or

- (b) Define the energy of activation for a chemical reaction. Explain how the Arrhenius equation relates temperature to the rate constant of a reaction.

20. (a) Explain the photochemical reaction of hydrogen with chlorine.

Or

- (b) Discuss the mechanism of phosphorescence and provide examples.
-