

(FOR THE CANDIDATES ADMITTED  
DURING THE ACADEMIC YEAR 2022-25 ONLY)

SUBJECT CODE **22 UMS 4A4**  
**22 UCY 4A4**

REG.NO.

**N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI**  
**END-OF-SEMESTER EXAMINATIONS : MAY – 2024**

**B.Sc. – MATHEMATICS / CHEMISTRY**

**MAXIMUM MARKS: 50**

**SEMESTER: IV**

**TIME : 3 HOURS**

**PART – III**  
**PHYSICS FOR MATHEMATICS AND CHEMISTRY – II**  
**SECTION – A (10 X 1 = 10 MARKS)**

**ANSWER THE FOLLOWING QUESTIONS. (K1)**

- The work done to bring a unit positive charge from infinite distance to required distance is .....  
a) energy      b) capacitance      c) potential      d) electric current
- The sum of the spacing between one opaque and one transparent region in a grating is referred to as .....  
a) corresponding points      b) grating element      c) slit width      d) size of the grating
- Semiconductor materials have ----- bonds  
a) ionic      b) vanderwalls      c) covalent      d) metallic
- Hexadecimal equivalent for the decimal number 15 decimal is .....  
a) 9      b) C      c) k      d) F
- An XOR gate produces an output only when its two inputs are .....  
a) high      b) low      c) different      d) same

**ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES. (K2)**

- Define the term “Capacity of capacitance“ .
- What is polarization?
- Mention at least one application of a rectifier.
- Convert the binary number 1001 into octal number.
- Write the truth table for NAND gate.

**SECTION – B (5 X 3 = 15 MARKS)**

**ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)**

- a) Describe the working of parallel plate capacitor and deduce the equation for it.

(OR)

- b) State and explain the Kirchoff’s voltage law with circuit diagram.

- a) Give the Hygiene’s theory of phenomenon of interference .

(OR)

- b) How do you differentiate between unpolarized light and polarized light? Explain with an illustration.

**(CONTD .... 2)**

13. a) What are known as intrinsic semiconductors? Explain their behavior with example.  
(OR)  
b) Draw the basic diagram of a transistor and describe the functions of various regions.
14. a) What are the steps to be followed to convert a binary number into a decimal number? Explain with at least two examples.  
(OR)  
b) Write a note on excess 3 code with two examples.
15. a) Draw the logic diagram for OR, AND, XOR, NAND, NOR and NOT gate with truth table and symbol.  
(OR)  
b) State and prove Demorgan's theorem.

**SECTION – C (5 X 5 = 25 MARKS)**

**ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.**

**(K4 (Or) K5)**

16. a) Deduce the expression for the field along the axis of the coil using Biot Savart law.  
(OR)  
b) What is potentiometer? Describe a method of calibration of an ammeter using potentiometer.
17. a) What is Newton's ring? Describe the formation of Newton's ring with theory of Newton's ring.  
(OR)  
b) Explain the theory of grating and describe a method of determination of wavelength of a spectral line.
18. a) What is zener diode? Draw the circuit diagram for forward and reverse biased I-V characteristic curve and explain.  
(OR)  
b) Draw the circuit diagram for the common emitter configuration of a transistor and explain the input and output graphs.
19. a) Explain binary addition, binary subtraction, binary multiplication, and binary division with at least one example in each.  
(OR)  
b) i) Describe the procedure for 2's complement subtraction with two examples.  
ii) What are the decimal equivalent for the following binary numbers that give the method of conversion?  
a) 101.11                      b) 10100
20. a) Prove the following Boolean identity and mention the Boolean laws used.  
i)  $A + \bar{A}B = A + B$   
ii)  $(A+B)(A+C) = A+BC$   
(OR)  
b) Draw the circuit diagram for Half adder and full adder and explain its working.

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