UG PROGRAM (4 YEARS HONOURS) WITH SINGLE MAJOR
AT THE END OF FIRST SEMESTER
ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES - AMPC
B.Sc (Chemistry, Computer Science, Data Science, Artificial Intelligence)
(w.e.f. Admitted Batch 2024 - 25)

Time: 3Hours   Maximum: 70 Marks

Section - A

I. Answer the Following Multiple Choice Questions: **30 X 1 = 30 M**

1. Two lines with slopes m_1 and m_2 are perpendicular to each other if
   (a) $m_1 = m_2$ (b) $m_1 = m_2 = 1$ (c) $m_1.m_2 = -1$ (d) $m_1 = m_2 = -1$ [   ]

2. $\lim_{x \to 4} \frac{x^2 - 16}{x - 4} =$ [   ]
   (a) 2   (b) 8   (c) 4   (d) none

3. $\frac{d}{dx}(\sqrt{Tan\ x})$ is   [   ]
   (a) $2\sqrt{Tan\ x}$ (b) $\frac{sec\ x}{2\sqrt{Tan\ x}}$ (c) $2\ Tan\ x$ (d) $\frac{sec^2 x}{2\sqrt{Tan\ x}}$ [   ]

4. $\int \sin 2x\ dx$
   (a) $\frac{\cos 2x}{2} + c$ (b) $\cos 2x + c$ (c) $\frac{-\cos 2x}{2} + c$ (d) $\frac{-\cos x}{2} + c$

5. $\begin{vmatrix} \sin 35° & -\cos 35° \\ \sin 55° & \cos 55° \end{vmatrix} =$ [   ]
   (a) 1   (b) 0   (c) -1 (d) 2

6. Slope-intercept form of a line is   [   ]
   (a) $y - y_1 = m(x - x_1)$ (b) $y = mx + c$
   (c) $\frac{x}{a} + \frac{y}{b} = 1$ (d) $y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$

7. $\frac{d}{dx}(\log(secx + Tanx))$ is   [   ]
   (a) $Tan\ x$ (b) $secx + Tanx$ (c) $\frac{1}{secx + Tanx}$ (d) $\sec x$

8. What are some main concerns associated with the usage of cadmium-based
   quantum dots   [   ]
   (a) Impact on environment, health & society
   (b) Decreased quantum efficiency
   (c) Difficulty in laberication
   (d) Limited availability of cadium resources.

9. Which energy source contributes the most to the total primary energy production
   in India.   [   ]
   (a) Oil   (b) Natural gas   (c) Coal   (d) Nuclear

10. Which type of shape memory material is made up of length chains of
   repeating units   [   ]
   (a) shape memory alloys   (b) shape memory polymers
   (c) Brain spatula   (d) Nickel & titanium alloy

11. How do Quantum dots enhance the effectiveness of solar cell?   [   ]
  (a) They increase the absorption of sun light
  (b) They reduce the cost of solar cell production
  (c) They increase the life time of solar cell
  (d) They lower the required temperature for solar cell operation.
12. According to the IEA world energy out look 2013the primary energy   [   ]
  consumption to the country (India) in 2008 is
  (a) 9319   (b) 6987   (c) 2695   (d) 5058
13. What is the key feature of smart grids   [   ]
  (a) Real time monitoring & control   (b) lack of automation
  (c) Dependence of Renewable energy   (d) In efficiency in energy distribution
14. Tidal energy is obtained through
  (a) Sun light (b) Wind (c) Oceanic tides   (d) Biomass
15. The non-metal is used in disinfecting of water   [   ]
  (a) chlorine   (b) bromine   (c) iodine   (d) none
16. Which disease tobacco smoke causes?   [   ]
  (a) Lung cancer   (b) Throat cancer   (c) Blood cancer   (d) None
17. Ozone layer depletion is caused due to increase in the level of   [   ]
  (a) Water vapour   (b) CO   (c) CFC's   (d) O_2
18. CADD involves   [   ]
  (a) Molecular modelling   (b) Virtual screening (c) QSAR   (d) All
19. Which of the following is an air pollutant   [   ]
  (a) Ozone   (b) Methane   (c) Sulphur dioxide   (d) All
20. CADD stands for   [   ]
  (a) Computer aided drug discovery   (b) Chemistry aided drug delivery
  (c) Computer application of drug discovery   (d) None   [   ]
21. Sources of chemical pollutants from
  (a) Industrial wastages   (b) Agricultural wastages
  (c) Medical wastages   (d) All   [   ]
22. Which number system in foundational for computer science?
  (a) Binary   (b) Decimal   (c) Octal   (d) Hexadecimal
23. Analog signals are widely used in which of the following applications?   [   ]
  (a) Sensor readings   (b) Digital video
  (c) Temparature measurement   (d) All of the above
24. What technology allows DSL modems to separate voice and data signals   [   ]
  (a) ADSL   (b) Broad band   (c) Fiber optics   (d) Wifi
25. Which of the following is an advantage of repeaters?   [   ]
  (a) Network segmentation   (b) Enhanced network security
  (c) Efficient data forwarding   (d) Signal amplification   [   ]
26. A parity check usually can detect
  (a) 1bit error   (b) 2 bit error   (c) 3 bit error   (d) Any bit error
27. What does the term "modem " stand for ?   [   ]
  (a) Modern device   (b) Modulation-de modulation

(c) Multiplexing device   (d) Mobile data

28. What serves as a bridge between different networks allowing communication?

    (a) Switch   (b) Router   (c) Gateway   (d) None

29. Which type of router is commonly used in home networks?   [   ]

    (a) Core router   (b) Edge router

    (c) Distribution router   (d) Home router

                                                                     [   ]

30. Who is the father of Computer?

    (a) James Goslings   (b) Charles Babbage   (c) Tim Berner Lee   (d) None

<div align="center">SECTION-B</div>

II Fill in the blanks $10 \times 1 = 10$ M

31. The equation of the line passing through (3,2) and making an angle of $45°$ with x-axis is _____

32. $\lim_{x \to 0} \left(\frac{1-\cos}{x^2} \right) =$ _____

33. PET is a medical imaging technology used to see & access the _____ & _____ of numerous organs.

34. Quantum dots emit light at very specific wave lengths, resulting in _____

35. QSAR stands for _____

36. The catalyst used in dye Removal Catalysis Method is _____.

37. _____ networking device is used to overcome the distance limitations of ethernet cabling.

38. _____ number system is commonly used for memory addressing and low level programming.

39. If 2x+3y $= \sin x$, then $\frac{dy}{dx}$ is _____

40. The process of heating biomacs in a low-oxygen atmosphere to produce sungass is known as _____

<div align="center">SECTION-C</div>

III Very short answer questions $10 \times 1 = 10$ M

41. Transform the equation of the line 3x+4y−12 = 0 into intercept form.

42. Evaluate $\lim_{x \to 5} \frac{x^2 - x - 20}{x - 5}$.

43. What is Nanotechnology?

44. What are the advantages of tidal power generation?

45. What is Catalyst?

46. What is global warming.

47. Convert binary to octal = $(11001)_2$ =

48. What is a Hub?

49. Find the derivative of $e^x \sin x$.

50. Define quantum dots? Mention the applications of quantum dots.

SECTION-D

IV Matching   10 × 1 = 10 M

51. Slope of x-axis is   (   )   a) Sec x Tan x

52. $\lim_{x \to 0} \frac{\sin x}{x} =$ (   )   b) Value

53. $\frac{d}{dx}(Secx)$ is   (   )   c) 0's & 1's

54. Renewable energy   (   )   d) routing of IP address

55. Shape memory alloy   (   )   e) 1

56. Quantum dot   (   )   f) solar

57. Plastic wastage   (   )   g) Ni-Ti

58. Eutrophication   (   )   h) cd-Te

59. Repeater   (   )   i) pollutant

60. Cheksum   (   )   j) Algaeblooms

SECTION-E

V True or False   10 × 1 = 10 M

61. Equation of y-axis is, x = 0   [   ]

62. $\lim_{x \to 0} \frac{1-\cos\ x}{1-\cos\ x} = \frac{m}{n}$ [   ]

63. Derivative of a constant is 1   [   ]

64. Geothermal energy is used to generate electricity   [   ]

65. MRI scan provides more superior images of internal body parts
    than CT scan.   [   ]

66. Dendrimers are cylindrical structure   [   ]

67. The Ozone layer filters UV rays & prevent them reaching earth [   ]

68. CADD plays a role only in pre clinical tests and not in clinical tests [   ]

69. CRC provide built-in-error correction capabilities   [   ]

70. Digital signals are characterized by continuity   [   ]

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