

BSC-MATHS/PHYSICS/CHEMISTRY/COMPUTER SCIENCE

I SEMESTER

Course 2: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

MODEL PAPER

**SECTION-A
(MULTIPLE CHOICE QUESTIONS)**

1. Two lines with slopes m_1 & 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. $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4} =$ []
A. 2 B. 4 C. 8 D. undefined
3. What is the standard form of LNG? []
A. Liquefied Natural Gas B. Liquefied Nuclear Gas
C. Liquefied Natural or Nuclear Gas D. None of the above
4. Which one of the following damages the ozone layer? []
A. CFCs B. Aerosols C. Freons D. All of the above
5. In which era CADD molecular biology started? []
A. 1890 B. 1795
C. 1980 D. 1675
6. In which year the GIT developed the first nanosensor? []
A. 1888 B. 1988 C. 1788 D. 1999
7. Which mathematical concept is the basis for error-correcting codes used in Computer Science? []
A. Group theory B. Probability theory
C. Game theory D. Differential Equations
8. In which one of the following nanomaterials quantum confinement occurs in two directions? []
A. One dimensional B. Two dimensional
C. Three dimensional D. Zero dimensional
9. Which of the following number system is known as base-10 system. []
A. Binary Number System B. Hexadecimal Number System
C. Octal Number System D. Decimal Number System
10. Which one of the following network devices stores the IP addresses? []
A. Router B. Switch
C. Both A and B D. None of the above

11. In what ratio the x-axis divide the line segment joining the points (2,-3) and (5,6) []
 A. 1:2
 B. 2:1
 C. 1:3
 D. None of these
12. If the matrices $\begin{bmatrix} 3x + 7 & 5 \\ y + 1 & 2 - 3x \end{bmatrix} = \begin{bmatrix} 5 & y - 2 \\ 8 & 4 \end{bmatrix}$ then the values of x and y are []
 A. $x = -1/3, y = 7$
 B. $x = -1/3, y = -2/3$
 C. $x = -2/3, y = 7$
 D. $x = 5, y = -2/3$
13. The measurement range of small angle X-ray scattering is around _____ meters? []
 A. 5 nm
 B. 5-500 m
 C. 20 m
 D. 12 mm
14. The carbon nanotubes, graphene, and fullerenes are the _____ based nanoparticles? []
 A. Organic
 B. Inorganic
 C. Carbon based
 D. None of the above
15. Expand QSARs []
 A. Quantitative structure activity relationship
 B. Quality strong applicable relationship
 C. Quality strengthen affordable ratio
 D. Quantitative sorted affinity refund
16. In which drug design structure of the target protein is known? []
 A. SBDD
 B. CBDD
 C. QSAR
 D. GIT
17. Which of the tool is used to find favorable bioactive compounds? []
 A. Virtual screening
 B. QSAR
 C. CADD
 D. None of the above
18. What is the primary focus of Biophysics? []
 A. The study of living organisms' behavior
 B. The study of the physical properties of living organisms
 C. The study of the chemical reactions in living organisms
 D. The study of the genetics of living organisms
19. Binary equivalent of decimal number 65 is []
 A. 1000001
 B. 1000000
 C. 1000011
 D. 100001
20. What is the name for converting digital signal to analog signal? []
 A. Modulation
 B. Demodulation
 C. Bypass
 D. Encapsulation
21. If $y = \log(\tan x)$, then dy/dx is []
 a) $\frac{1}{\tan x}$ b) $\frac{\sec^2 x}{\tan x}$ c) $-\sec^2 x$ d) 0

22. $\lim_{x \rightarrow 1} \frac{x^{15}-1}{x^{10}-1} =$ []
 A. 3/2 B. 5/2 C. 1/2 D. 7/2

23. How does Biophysics contribute to the field of neuroscience? []
 A. By studying the social behavior of organisms
 B. By developing new brain imaging techniques
 C. By analyzing the genetic basis of neurological disorders
 D. By studying the electrical signaling in neurons

24. The forces acting on a runner near the end of a race are []
 A. Weight B. friction
 C. Air resistance D. all the above.

25. Nanosensors are which type of sensors? []
 A. Chemical sensor, mechanical sensor B. Physical sensor
 C. Both a&b D. none of the above

26. Chemical biology is combination of which subjects []
 A. Physics & Zoology B. Chemistry & Biology
 C. Botany & Zoology D. All of the above

27. Which of the following is an extremely harmful chemicals? []
 A. Bisphenol B. Ethanol C. HCl D. NH₃

28. $\int x \sec^2 x \, dx =$ []
 A. $\tan x + \log |\sec x| + c$ B. $\log |\tan x| + \sec x + c$
 C. $x \tan x - \log |\sec x| + c$ D. $x \tan x + \log |\sec x| + c$

29. Identify the first network which was based on TCP/IP. []
 A. ARPANET B. HUB
 C. Router D. Ethernet Card

30. Base value of the Hexadecimal number System is? []
 A. 2 B. 10 C. 16 D. 8

SECTION-B
(FILL IN THE BLANKS)

31. $\int 10^{5x} \, dx =$

32. The line which cuts off equal intercepts from the axes and pass through the point (1, -2) is _____

33. Standard form of CNT is _____++

34. The ratio of the surface of the collector receiving light divided by the total surface of the collector is known as _____

35. Full form of CADD _____

36. _____ developed the first nanosensor.
37. _____ chemical cause cancer and heart disease as well as infertility in human being.
38. Radiosotope used for estimation of plasma volume is _____
39. _____ has only two possible values 0 and 1.
40. _____ network device connects two different networks.

SECTION-C
(VERY SHORT ANSWERS)

41. Find the equation of the straight line cutting off an intercept 3 from the negative direction of the y-axis and inclined at 60° to the axis of x
42. Evaluate $\int e^x(1 + x^2)dx$
43. what is Quantum Key distribution
44. How does Biophysics contribute to the field of medical imaging?
45. What is chemical biology ?
46. State chemical pollution ?
47. If $x = -9$ is a root of $\begin{vmatrix} x^3 & 7 \\ 2x^2 & 6 \\ 7 & 6x \end{vmatrix} = 0$, , then find the other roots?
48. What is the standard form of NOMFET?
49. What is MODEM?
50. Define Transmission media?

SECTION-D
(MATCH THE FOLLOWING)

- | | |
|---|--|
| 51. Intercept form of a straight-line | A) Quantum Confinement in all directions |
| 52. Mathematical modeling for rate of chemical reaction | B) Brain and spinal cord |
| 53. Zeo dimension | C) Network Device |
| 54. Central Nervous system | D) Dye removal |
| 55. LBDD | E) Arrhenius Equation |
| 56. Molecular docking methods | F) The Address of The Web Page |

57. Nano sensors

$$G) \frac{x}{a} + \frac{y}{b} = 1$$

$$58. \int \frac{f'(x)}{f(x)} dx =$$

H) affinity and virtual screening

59.HUB

I) ligand based drug design

60.URL

$$J) \log |f(x)| + C$$

$$K) y=mx+c$$

$$L) e^{f(x)}$$

SECTION-E
(TRUE/FALSE)

61. If θ is the angle between two lines with slopes m_1 and m_2 , then $\tan\theta = \frac{m_1+m_2}{1+m_1m_2}$ []

62. If $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$, then $(A + B)^2 \neq A^2 + B^2$ []

63. At memory Transfer temperature a shape memory alloy return to its original shape []

64. Radiation kills fast-growing cells in the area of treatment []

65. Carbon nanotubes, quantum dots,etc are examples of nano sensors []

66. Bisphenol A (BPA) is an extremely harmful chemical. []

67. Mining, agriculture and waste disposal doesn't cause any pollution []

68. The high temperature phase in shape memory effect is Martensite []

69. A hub connects two different LANs. []

70.The computer network that began the internet was called ARPANET. []

I SEMESTER
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Marking Scheme
SECTION-A
(MULTIPLE CHOICE QUESTIONS)

QNo	Answer		QNo	Answer		QNo	Answer
1	D		11	A		21	B
2	C		12	C		22	A
3	A		13	A		23	B
4	D		14	C		24	D
5	C		15	A		25	A
6	D		16	A		26	B
7	A		17	A		27	A
8	A		18	B		28	C
9	D		19	A		29	A
10	A		20	A		30	C

SECTION-B
(FILL IN THE BLANKS)

31. $\frac{10^{5x}}{5 \log 10}$

32. $x+y+1=0$

33. Carbon Nano Tube

34. Shadow Factor

35. .Computer aided drug design

36. .Georgia Institute of technology

37. Bisphenol A

38. Iodine 125

39. BINARY NUMBER SYSTEM

40. GATEWAY

SECTION-C
(VERY SHORT ANSWERS)

41. $y = \sqrt{3}x - 3$

42. $(3+x^2 - 2x)e^x$

43. Quantum key distribution (QKD) is a secure communication method that implements a cryptographic protocol involving components of quantum mechanics.

44. Biophysics techniques are used to create vaccines, develop imaging techniques such as MRI and CAT scans etc

45. Chemical biology is a scientific discipline between the field of chemistry and biology. 46. Chemical pollution refers to the contamination of our environment with chemicals .

47. 2, 7

48. NOMFET is a nanoparticle organic memory field-effect transistor.

49. A Modem is an electronic device or network device which converts analog to digital signals and vice-versa.

50. Transmission media is a communication channel that carries the information from the sender to receiver.

SECTION-D (MATCH THE FOLLOWING)		SECTION-E (TRUE/FALSE)	
QNo	Answer	QNo	Answer
51	G	61	F
52	E	62	T
53	A	63	T
54	B	64	T
55	I	65	T
56	H	66	T
57	D	67	F
58	J	68	F
59	C	69	T
60	F	70	T