

BSMAT-SO102

B.Sc. DEGREE EXAMINATION, DECEMBER - 2023

MATHEMATICS

Advances in Mathematical, Physical and Chemical Sciences

(Semester - I) (CBCS Pattern) (Regular) (Paper - II)

(Course - II)

(w.e.f. 2023-2024 Admitted Batch)

Time : 3 Hours

Max. Marks : 75

SECTION - A

I. Multiple Choice Questions : (30×1=30)

1. The slope of the line through the points (2, 1) and (8, 5) is

a) $\frac{2}{3}$

b) $\frac{3}{2}$

c) $\frac{2}{5}$

d) $\frac{1}{5}$

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2. Equation of the line passing through (x_1, y_1) and with slope 'm' is _____.

a) $y - y_1 = m(x - x_1)$ b) $y - x = m(x_1 - y_1)$

c) $y_1 = mx_1$ d) None

3. $\lim_{x \rightarrow 0} \log(1+x) = \underline{\hspace{2cm}}.$

a) 1

b) 0

c) $\log x$

d) ∞

4. $\frac{d}{dx}(x^3) =$

a) $3x$

b) $4x^2$

c) $3x^2$

d) $6x$

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5. $\int \cos x \, dx = \underline{\hspace{2cm}}$.

a) $\tan x + c$ b) $-\sin x + c$

c) $-\tan x + c$ d) $\sin x + c$

6. If A is non-singular matrix, then $A^{-1} = \underline{\hspace{2cm}}$.

a) $\frac{\det A}{\text{Adj} A}$ b) $\frac{\text{Adj} A}{\det A}$

c) $\frac{\text{Adj} A}{A^T}$ d) $\frac{\det A}{A^T}$

7. Batteries are probably used for $\underline{\hspace{2cm}}$.

a) storing energy b) doing work

c) both (a).& (b) d) none

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8. Small-scale wind generators and mini-hydro systems generates.
- a) Voltage
 - b) Heat
 - c) Electricity
 - d) None
9. Using Biophysics, the structure of DNA was solved in ____.
- a) 1853
 - b) 1953
 - c) 1943
 - d) 1843
10. The size of quantum dot should be in the range of ____.
- a) $5\text{nm} < L < 25\text{nm}$
 - b) $3\text{nm} < L < 15\text{nm}$
 - c) $6\text{nm} < L < 12\text{nm}$
 - d) $4\text{nm} < L < 20\text{nm}$
11. The positive end of the battery is connected to an electrode called ____.
- a) Cathode
 - b) Anode
 - c) Diode
 - d) None

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12. Nano-materials are the materials with atleast one dimension measuring less than.

- a) 1 nm
- b) 10 nm
- c) 100 nm
- d) 1,000 nm

13. QSAR method involves.

- a) Target structure
- b) Target properties
- c) Ligand X-ray structure
- d) Ligand properties

14. Which one of the following is not a greenhouse gas.

- a) Methane
- b) Hydrogen
- c) Nitrous oxide
- d) Ozone

15. Global warming is mainly due to burning of ____.

- a) Fossil fuels
- b) Petroleum
- c) Kerosine
- d) Coal

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16. Which of the following is/are the examples of enzyme-mechanisms.

- a) Acid-base catalysis
- b) Covalent catalysis
- c) Metal-ion catalysis
- d) All of these

17. Drugs are directly injected into _____.

- a) Muscles
- b) Blood cells
- c) Veins
- d) All of these

18. Depletion of ozone layer causes _____.

- a) Increased transpiration
- b) Damages paints and fibres
- c) Causes aging of skin
- d) All of these

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19. PET means _____.

- a) Photon emission tomography
- b) Positron emission tomography
- c) Proton emission tomography
- d) P-orbital emission tomography

20. Nano technology used in _____.

- a) Medical science
- b) Material science
- c) Environment conservations
- d) All of these

21. Biomechanics is a branch of _____.

- a) Biophysics
- b) Biochemistry
- c) Neuro physics
- d) Neuro chemistry

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22. X-rays were discovered by _____.

- a) Marie Curie
- b) Edward Jenner
- c) Robert Koch
- d) Wilhelm Conrad Roentgen

23. _____ can be treated through neuro physics therapy.

- a) Arthritis
- b) Rehabilitation
- c) Both (a) and (b)
- d) None

24. Which of the following are sources of solid waste.

- a) Food stores
- b) Ware houses
- c) Medical centres
- d) All of these

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25. Which of the following is the binary equivalent of 25?

- a) 11010
- b) 11001
- c) 10111
- d) 10101

26. What is the name for convert digital signal to analog signal?

- a) Modulation
- b) Demodulation
- c) By pass
- d) Encapsulation

27. The sharing of a medium and its link by two or more devices is

- a) Fully duplexing
- b) Multiplexing
- c) Microplexing
- d) Duplexing

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28. The _____ of errors is more difficult than the _____.

- a) Correction; Detection
- b) Detection; Correction
- c) Creation; Correction
- d) Creation; Detection

29. Which of the following network devices stores the IP address.

- a) Router
- b) Switch
- c) Both (a) & (b)
- d) None

30. What is the standard form of SNMP?

- a) Simple Network Management Protocol
- b) Simple Network Protocol
- c) Simple Management Protocol
- d) Standard Network Management Protocol

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II. Fill in the Blanks:

[10×1=10]

1. The equation of a line passing through the points (0, 1) and (3, 2) is _____.
2. $\lim_{x \rightarrow 2} \frac{x^2 - 3x + 2}{x - 2} = \underline{\hspace{2cm}}$.
3. _____ energy is converted into electrical energy by a solar cell.
4. The term "quantum dot" was coined by _____.
5. CADD means _____.
6. The drug word is derived from _____.
7. Radiotherapy, is a type of _____.

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8. The burning of solid waste is not recommended because _____.
9. _____ is the name for convert digital signal to analog signal.
10. The full form of LAN is _____.

SECTION - B

III. Very short answer questions :

(15×1=15)

1. Write the intercept form of the equation of straight line.
2. Evaluate $\int (9x^2 + 5x + 3) dx$.
3. If $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 \\ 1 & 4 \end{bmatrix}$ then find $3A - 4B$.

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4. What is solar energy?
5. What are quantum dot solar cells?
6. What are renewable energy sources?
7. What are various stages of drug design?
8. What are the applications of nano-sensor?
9. What is dye removal?
10. Explain Radiation therapy.
11. What are the sources of solid waste?
12. What is Nuclear-medicine?
13. What is Multiplexing.
14. What is Bridge?
15. Define Gateway.

[13]

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IV. Match the following :

[10×1=10]

- | | |
|-----------------------------|---------------------------------|
| 1. $\frac{d}{dx}(12x)$ | a. $3x^3$ |
| 2. $\int 9x^2 dx$ | b. flow of water |
| 3. Nitrogen dioxide | c. chlorination |
| 4. Conventional solar cells | d. 12 |
| 5. Hydraulic power | e. X-rays |
| 6. Insulin | f. coder-decoder |
| 7. Water treatment | g. Error dection and correction |
| 8. Radiation therapy uses | h. Photovoltaic |
| 9. Codec | i. NO_2 |
| 10. Cyclic Redundancy Check | j. Diabatics |

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SECTION-C

V. True or False :

[10×1=10]

1. Is $\frac{d}{dx}(\cos x) = -\sin x$?

a) True

b) False

2. Is matrix addition commutative?

a) True

b) False

3. All renewable sources of energy are based on sunlight.

a) True

b) False

4. Coal is a biomass fuel.

a) True

b) False

5. All drugs are harmful.

a) True

b) False

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[15]

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6. The Nervous system includes the brain and spinal cord.
a) True b) False
7. Municipal solid waste is the same as hazardous waste.
a) True b) False
8. Disinfection of water is the most important water treatment step.
a) True b) False
9. The speed of the modern is measured in bits per second.
a) True b) False
10. A hub connects multiple wires coming from different branches.
a) True b) False

