

## BSMAT-SO101

B.Sc. DEGREE EXAMINATION, DECEMBER - 2023

### MATHEMATICS

Essentials and Applications of Mathematical, Physical  
and Chemical Science

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

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

Time : 3 Hours

Max. Marks : 75

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### SECTION-A

I. Multiple choice questions: (30×1=30)

1. The value of  $\sec 30^\circ$  is \_\_\_\_\_

a) 2

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

c)  $\frac{2}{\sqrt{3}}$

d)  $\sqrt{2}$

2.  $\frac{2\tan 60^\circ}{1+\tan^2 60^\circ}$  is equal to \_\_\_\_\_

a)  $\sin 60^\circ$

b)  $\sin 30^\circ$

c)  $\cos 60^\circ$

d)  $\tan 60^\circ$

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3. The modulus of the complex number  $(1+i)$  is \_\_\_\_\_
- a)  $\sqrt{2}$                       b) 2  
c) 1                                d)  $i$
4. If  $\vec{a} = 3\vec{i} + 2\vec{j} - 6\vec{k}$  and  $\vec{b} = 4\vec{i} - 3\vec{j} + \vec{k}$  the  $\vec{a} \cdot \vec{b} =$  \_\_\_\_\_
- a) 1                                b) 3  
c) 2                                d) 0
5. Mode of the data : 15, 14, 19, 20, 14, 15, 14, 18, 14, 15, 14,
- a) 20                                b) 18  
c) 15                                d) 14
6. The average of 605, 710, 745, 835, and 910 is \_\_\_\_\_
- a) 3805                          b) 761  
c) 745                             d) 710

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7. The Unit of quantity of matter\_\_\_\_\_
- a) Candela                      b) Kelvin  
c) Mole                          d) Meter
8. Sound is a \_\_\_\_\_ Phenomenon
- a) Wave                          b) Circle  
c) Square                        d) None
9. Who is discovery of Electron?
- a) Ruther ford  
b) James chadwick  
c) J.J. Thomson  
d) Gold Stein
10. Example of Semi conductor materials\_\_\_\_\_
- a) Ge                              b) Si  
c) Both (a) & (b)              d) All of these

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11. How many types of electro magnetic waves

- a) 5                      b) 6  
c) 7                      d) 9

12. Sound waves move through sea water\_\_\_\_\_

- a) 1450m/s                      b) 1200m/s  
c) 1400 m/s                      d) 1500 m/s

13. Which of the following drug is used for AIDS patients?

- [illegible]

14. Who is the father of modern periodic table.

- a) Douber neer                      b) Mosley  
c) Mendeleev                        d) Nel's Bhor.

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15. Another name of 16 group elements is called \_\_\_\_\_

- a) Halogens                      b) Paicogens
- c) Chalkogens                  d) Nobel gases

16. The valency of nobel gases are \_\_\_\_\_

- a) 0                                  b) 8
- c) 2                                  d) 6

17. Which one is P-block element.

- a) Mg                                b) N
- c) V                                  d) K

18. Which element is shows  $ns^2np^3$  electronic configuration.

- a) B                                  b) Al
- c) N                                  d) V

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19. Optics is related to \_\_\_\_\_

- a) Behaviour of light
- b) Behaviour of heat
- c) Behaviour of water
- d) Behaviour of air.

20. Spectroscopy is used to analyze and interpret spectra of

- a) Atoms
- b) Molecules
- c) Both (a) & (b)
- d) None

21. Maxwell's equations to describe the behaviour of

\_\_\_\_\_

- a) Light
- b) Electric and magnetic fields
- c) Water
- d) Wind

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22. Physics-based modeling is crucial in designing \_\_\_\_\_ for robots
- a) Control system
  - b) Sensors and perception
  - c) Trajectory planning
  - d) Robot locomotion
23. APIs stands for \_\_\_\_\_
- a) Analytical pharmaceutical Ingredients.
  - b) Active pharmaceutical Ingredients.
  - c) Analytical polymer Ingredients
  - d) Active polymer Ingredients
24. Green chemistry reactions are \_\_\_\_\_
- a) Aoblition economic reactions.
  - b) Elimination economic reactions.
  - c) 100% atom economic reactions.
  - d) Substitution economic reactions

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25. Which computer works on data in 0's and 1's
- a) Digital computer
  - b) Hybrid computer
  - c) Physical computer
  - d) Analog computer.
26. The size of an IP address in IPV6 is \_\_\_\_\_
- a) 32 bits
  - b) 64 bits
  - c) 128 bits
  - d) 265 bits
27. Physical & logical arrangement of network is \_\_\_\_\_
- a) Topology
  - b) Routing
  - c) Networking
  - d) Control
28. DNS database contains \_\_\_\_\_
- a) Name server records
  - b) Hostname -to -address records
  - c) Hostname aliases
  - d) All of these



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29. Which of the following is a programs that copy themselves throughout a computer or network

- a) Worms                      b) Trojans
- c) Viruses                    d) Rootkils

30. A network that links many different types of computer all over the world.

- a) Intranet                  b) Internet
- c) Arpanet                  d) LAN

II. Fill in the blanks:

(10×1=10)

1. The conjugate of  $3+4i$  is \_\_\_\_\_

2. The value of  $\cos^2\theta + \sin^2 \theta$  is \_\_\_\_\_

3. Units of current is \_\_\_\_\_

4. To calculate the speed of the ship using which effect \_\_\_\_\_

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5. Conversion of sunlight directly to electricity using devices called \_\_\_\_\_
6. The study of structure, properties and reaction of non-carbon chemical compounds is called \_\_\_\_\_
7. Carbohydrates are \_\_\_\_\_
8. Schrodinger's equation is a partial differential equation that involves derivatives with respect to \_\_\_\_\_ and \_\_\_\_\_
9. Network comprising of multiple topologies is called \_\_\_\_\_
10. \_\_\_\_\_ computers can be easily used for individual use.

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## SECTION-B

III. Very short answer questions:

(15×1=15)

1. Evaluate  $(1+2i)(1-3i)$
2. Find the median of the data : 5,12,16,18,20,25,10
3. If  $\sin 2A = 2\sin A$ , then find the value of A
4. What is photoelectric effect?
5. Define Newton's second law?
6. Define Fleming's left hand rule?
7. How many groups are there in the modern periodic table?

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8. Name a substance which exists naturally in all the three states?
9. What do you mean by fats?
10. How physics helps in environmental monitoring?
11. Write any two uses of chemistry in food industry?
12. Write any two applications of calculus in physics.
13. What are the characteristics of a computer?
14. What is digital signature?
15. Define network?

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IV. Match the following:

(10×1=10)

- |                      |                                  |
|----------------------|----------------------------------|
| 1. $e^{i\theta}$     | a) 100-400nm                     |
| 2. $\sin 45^\circ$   | b) Si                            |
| 3. Proton            | c) Halogens.                     |
| 4. UV-rays           | d) $\cos \theta + i \sin \theta$ |
| 5. Metalloid         | e) Ascorbic acid                 |
| 6. If group elements | f) wireless fidelity             |
| 7. Proteins          | g) Trusted entity                |
| 8. Vitamin C         | h) Amino acids                   |
| 9. WIFI              | i) $\frac{1}{\sqrt{2}}$          |
| 10. Spoofing         | j) Rutherford                    |

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## SECTION-C

V. True or false:

(10×1=10)

1. If  $|z_1 + z_2| \leq |z_1| + |z_2|$

a) True

b) False

2. The observation that occurs most frequently in the data is called mode.

a) True

b) False.

3. Magnetic line of forces never intersect each other

a) True

b) False

4. "Neutron" discovered by J.J. Thomson

a) True

b) False.

5. Chemical change is generally irreversible process.

a) True

b) False.

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6. Starch is an example of reducing sugar.  
a) True                      b) False.
7. Special relativity, solving problems involving space time and Lorentz transformations.  
a) True                      b) False.
8. Aerodynamics describes the behaviour of air around aircraft surfaces.  
a) True                      b) False.
9. The CPU is reffered as the stomach of the computer  
a) True                      b) False.
10. Vaccum tubes are used in third generation of computers.  
a) True                      b) False.

