



P.R. GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
SEM END EXAMINATIONS DEC - 2024
IB, SC MATHS STREAM : ESSENTIALS AND APPLICATIONS IN
MATHEMATICAL, PHYSICAL & CHEMICAL SCIENCES

TIME: 2 HRS

SEMESTER	I	QP CODE	23CORE11
DATE & SESSION	20.12.24 & AN	REG NO	
		MAX MARKS	50

I. Answer the following Multiple-Choice Questions

21 X 1 = 21 M

- The conjugate of $\frac{1}{3+4i}$ is
 A. $3 + 4i$ B. $\frac{3-4i}{25}$ C. $3 - 4i$ D. None of these
 []
- If $|a| = 10$, $|b| = 2$ and $\vec{a} \cdot \vec{b} = 12$, then the value of $|\vec{a} \times \vec{b}|$ is
 A. 5 B. 10 C. 14 D. 16
 []
- If ΔPQR is right angled at R, then the value of $\cos(P+Q)$ is
 A. 1 B. 0 C. $\frac{1}{2}$ D. $\frac{\sqrt{2}}{2}$
 []
- The arithmetic mean of 1, 2, 3, ..., n is
 A. $\frac{n-1}{2}$ B. $\frac{n+1}{2}$ C. $\frac{n}{2}$ D. $\frac{n}{2} + 1$
 []
- The roots of the equation $x^2 + 1 = 0$ is
 A. 1 B. -1 C. $\pm i$ D. None
 []
- What are the SI units of Energy
 A. $\text{kg meter}^2/\text{Sec}^2$ B. $\text{kg meter}/\text{sec}^2$ C. $\text{kg meter}/\text{sec}$ D. $\text{kg meter}^2/\text{sec}^2$
 []
- What is the postulate of the special theory of relativity regarding the speed of light?
 A. It depends on the observer's frame of reference
 B. It is absolute in all inertial frame of reference.
 C. It decreases with increasing velocity
 D. It is infinite
 []
- The formula for First Law of Thermodynamics in terms of the Heat energy (ΔQ), Internal Energy (ΔU) and Workdone (ΔW) on the system as follows.
 A. $\Delta U = \Delta Q + \Delta W$ B. $\Delta U = \Delta Q - \Delta W$ C. $\Delta Q = \Delta W - \Delta U$ D. None of these
 []
- Which of the following is an example for acoustic waves.
 A. Light waves B. Sound waves C. Electromagnetic waves D. Matter waves
 []
- Which of the following is an example of a chemical change?
 A) Melting ice B) Dissolving salt in water
 C) Burning wood D) Cutting paper
 []
- What is the branch of chemistry that deals with the study of carbon compounds?
 A) Organic Chemistry B) Inorganic Chemistry
 C) Physical Chemistry D) Analytical Chemistry
 []
- What is the central metal ion in the hemoglobin of human body?
 A) Fe^{2+} B) Ca^{2+} C) Zn^{2+} D) Mg^{2+}
 []
- What is the most abundant element in the Earth's crust?
 A) Oxygen B) Silicon C) Aluminium D) Carbon
 []

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- What is a key application of electronics and the semiconductor industry?
 A) Agriculture B) Waste management C) Robotics D) Archaeology
 []
- Which laws are fundamental for physics-based algorithms used in robotics?
 A) Boyle's Laws B) Newton's Laws C) Ohm's Laws D) Kepler's Laws
 []
- Which application is NOT associated with sustainable technologies?
 A) Waste reduction B) Renewable energy C) Increasing pollution D) Recycling
 []
- In the semiconductor industry, what does "fabrication" refer to?
 A) Designing computer software B) Manufacturing semiconductor devices
 C) Creating clothing D) Recycling waste materials
 []
- Who of the following is known as Father of computer
 A) Dennis Ritchie B) Napier C) Charles Babbage D) Alan Turing
 []
- The first Network was called
 A) CNNET B) NSFNET C) ASARNET D) ARPANET
 []
- The process of verifying the identity of a user.
 A) Authentication B) Identification C) Validation D) Verification
 []
- Alan _____ algorithm transforms cipher text to plaintext.
 A) Encryption B) Decryption C) Both (A) and (B) D) None of the above
 []

II. Answer the following Fill in the blanks

7 X 1 = 7 M

- Which is not a measure of central tendency _____
- The number $\frac{(3-i)^2}{1-i^3}$ is equal to _____
- Physics is the scientific study of _____ and energy.
- Maxwell's equations describe the interactions of _____ and _____ fields.
- In the periodic table, elements in the same column are called _____
- According to _____, an orbital can hold only two electrons.
- Encrypted plain text is called _____

III. Answer the following. TRUE/FALSE

7 X 1 = 7 M

- For symmetrical distribution, mean = median = mode []
- The first law of thermodynamics states that energy cannot be created nor be destroyed. []
- Vitamin-B3 is also known as Niacin. []
- Milk is a good source of vitamin C []
- Collision avoidance in robotics involves encouraging intentional collisions for communication. []
- Quality control and instrumentation are critical in the pharmaceutical industry for reliable outcomes. []

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35. Vacuum tubes dissipate very low heat. []
 IV. Answer the following Very Short / One Word Answer Questions. 7 X 1 = 7 M

36. Evaluate $\cos 30^\circ \cos 45^\circ - \sin 30^\circ \sin 45^\circ$
37. Find $(\vec{a} \times \vec{b})$, if $\vec{a} = i - 7j + 7k$ and $\vec{b} = 3i - 2j + 2k$
38. State Newton's Third Law.
39. What is the scientific name of Vitamin K?
40. What does collision avoidance refer to in the context of robotics and automation? Answer:
41. DNS stands for?
42. List the types of IP address.

V. Match the following.

2 X 4 = 8 M

Column-I	Match Here	Column-II
43. Conjugate of $\frac{1+i}{1-i}$ lies in	43 -	A. $\frac{2\pi}{3}$
44. The amplitude of $-1 + \sqrt{-3}$ is $(0, -4)$ and radius 3	44 -	B. Third Quadrant
45. Reciprocal of $1 - i$ lies in	45 -	C. First Quadrant
46. The value of $\sec 90^\circ$	46 -	D. Not Defined

Column-I	Match Here	Column-II
47. Electronics and the semiconductor industry	47 -	A. Robotics
48. Sensors to detect obstacles.	48 -	B. Quality Control and Instrumentation
49. Aims to reduce waste.	49 -	C. Semiconductor Industry
50. Measuring processes for precision.	50 -	D. Sustainable Technologies

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