1. The function $f(x) = [x]$ is	a) Odd	b) Even	c) Neither even nor odd / d) None of the above
2. If $f(x) = \frac{1+x}{1-x}$ then $f^{-1}(y)$ is equal to	a) $\frac{1+y}{1-y}$	b) $\frac{1-y}{1+y}$	c) $\frac{y-1}{y+1}$ / d) None of the above
3. The domain and range of the function $f(x) = \sqrt{5 - 4x - x^2}$ are	a) $[-5,1]$ and $[0,3]$	b) $[5,1]$ and $[0,3]$	c) $[5,1]$ and $[0,-3]$ / d) None of the above
4. In the mean value theorem applied to the function $f(x) = +\sqrt{16 - x^2}$ in the interval $[-4,0]$ the value of c is	a) -3	b) $-\sqrt{15}$	c) 3 / d) None of the above
5. The positive number that exceeds its square by the largest amount is	a) ¼	b) -¼	c) ½ / d) None of the above
6. $\lim_{x \to 0} \frac{\cos 2x - \cos x}{(\sin x)^2}$ is equal to	a) ½	b) -1/4	c) -3/2 / d) None of the above
7. Let $X = \{-2,-1,0,1,2,3,4\}$, $Y = \{0,1,4,9,16\}$. The function $f: X \to Y$ given by $f(x) = x^2$ is	a) Onto but not one-to-one	b) One-to-one but not onto	c) One-to-one and onto / d) None of the above
8. The preposition equivalent to $P \to Q$ is	a) $Q \to P$	b) $\sim Q \to \sim P$	c) $\sim P \to \sim Q$ / d) None of the above
9. In a survey of 100 students in a music school, the number of students learning different musical instruments was found to be: Guitar: 28, Veena : 30, Flute: 42, Guitar and Veena :8, Guitar and Flute :10, Veena and Flute :5, All musical instruments :3. The number of students learning none of these three instruments is	a) 10	b) 20	c) 40 / d) None of the above
10. The value of $\sum_{n=0}^{\infty} \frac{2^{n-1}}{3^n}$ is	a) 2/3	b) 3/2	c) 1 / d) None of the above
11. Let f be the function defined by $f(x) = \begin{cases} x^2 + 2, x \leq 3 \\ 6x + k, x > 3. \end{cases}$ If f is continuous at $x = 3$, then the value of k is	a) 7	b) -7	c) -3 / d) None of the above
12. The general solution of the differential equation $\frac{dy}{dx} + \frac{3y}{x} = x^4$ is	a) $yx^3 = \frac{x^8}{8} + C$	b) $yx^3 + \frac{x^8}{8} = C$	c) $y = \frac{x^8}{8} + C$ / d) None of the above
13. The set S defined by $S = \{x \in \mathbb{N}: x + 5 = 4\}$ is	a) Infinite set	b) Null set	c) Singleton set / d) None of the above

	a)	b)	c)	d)
14. The value of the integral $\int \frac{e^{\tan^{-1}x}}{1+x^2}dx$ is	a) $e^{\tan^{-1}x} - x + C$	b) $-e^{\tan^{-1}x}$	c) $e^{-\tan^{-1}x} + C$	d) None of the above
15. The function $f(x) = |x - 2|$ is	a) Not continuous at $x = 2$	b) Differentiable at $x = 2$	c) Not differentiable at $x = 2$	d) None of the above
16. $f: \mathbb{R} \to \mathbb{R}$ is one-to-one	a) if each horizontal line intersects the graph of f in at most one point.	b) if each vertical line intersects the graph of f in at most one point.	c) if each vertical line intersects the graph of f in at many points.	d) None of the above
17. Let $f: \mathbb{R} \to \mathbb{R}$ and g: $\mathbb{R} \to \mathbb{R}$ be defined by $f(x) = 2x + 1$ and g(x) = $x^2 - 2$. Then the formula for the composition function $(gof)(x)$ is	a) $4x^2 + 4x + 1$	b) $4x^2 - 4x - 1$	c) $4x^2 + 4x - 1$	d) None of the above
18. The value of the expressions $\lfloor -7.5 \rfloor$ and $\lfloor 7.5 \rfloor$ are	a) -8 and 8	b) -7 and 7	c) -8 and 7	d) None of the above
19. Consider the following four statements: (i) Ice floats in water and 2 + 2 = 4. (iii) China is in Europe and 2 + 2 = 4. (ii) Ice floats in water and 2 + 2 = 5. (iv) China is in Europe and 2 + 2 = 5. The correct statement is	a) (i)	b) (ii) and (iii)	c) (iv)	d) None of the above
20. Consider the function $f: \mathbb{R} \to \mathbb{R}$ given by $f(x) = |x|$. Then	a) f is discontinuous at $x = 0$	b) Reflexive but not symmetric	c) f is continuous and differentiable	d) None of the above
21. Consider a relation R on the set of real numbers defined as $(x, y) \in R$ if $|x - y| \le 5$. Then the relation R is	a) Reflexive and symmetric but not transitive		c) Neither reflexive nor symmetric	d) None of the above
22. The integral $\int \frac{x^2}{(8+x^3)^4}dx$ is	a) $(8 + x^3) + C$	b) $C - \frac{1}{9(8+x^3)^3}$	c) $\frac{1}{9(8+x^3)^2}$	d) None of the above
23. The value of k so that the point $(2,1,k)$ lies at a distance $2\sqrt{2}$ from the plane $3x + 5y + 4z = 11$ is	a) 5	b) 4	c) -4	d) None of the above
24. The symmetric difference of {1,3,5,7,8} and {1,4,6,8} is	a) {3,5,7}	b) {2,4,6,8}	c) {3,4,5,6,7}	d) None of the above
25. The polar form of the complex number $1 + i\sqrt{3}$ is	a) $2e^{i\pi/3}$	b) $e^{i\pi/3}$	c) $2e^{-i\pi}$	d) None of the above

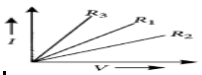# BSc. Physics, Chemistry, Mathematics, Computer Science, Biological Science

The question paper contains six sections consisting of general awareness (Section A), Physics (Section B), Chemistry (Section C), Mathematics (Section D), Computer Science (Section E) and Biological Sciences (Section F). The candidate has to attempt four sections. Section A is compulsory for all the candidates. The section related to the subject for which he/she has applied is also compulsory. Apart from that the candidate may attemp another two sections of his/her choice.

SECTION A -GENERAL AWARENESS (COMPULSORY)

1	Which of the following is not an operating system?	Oracle	Linux	MacOS	Windows
2	Which of the following languages is primarily used for web development?	Python	Java Script	C++	Java
3	Which of the following is a non-volatile memory?	Cache	RAM	ROM	Register
4	Which of the following is used to uniquely identify a computer on a network?	URL	Protocol	Domain Name	IP Address
5	Which of the following is not an example of a network topology?	Mesh	Cycle	Star	Ring
6	Mathematics is queen of all sciences was quoted by	Carl Friedrich Gauss	Ramanujan	Euler	None of the above
7	-40 °C is equal to	0 °F	-100 °F	-40 °F	None of the above
8	The symbol 0 was found earliest in the text	An Indian manuscript, Bakhshali	Greek text "The Iliad"	English text "Philosophae naturalis principia mathematica"	None of the above
9	The most famous unsolved problem in mathematics is	Hodge conjecture	Navier–Stokes existence and smoothness	Riemann Hypothesis	None of the above
10	Calculus was invented by	Euler	Issac Newton	Gauss	None of the above
11	Who formulated the theory of relativity	Albert Einstein	Heisenberg	Louis de Broglie	None of the above
12	Light Year is a unit of	Time	Distance	Light	None of the above
13	Light from the sun reaches us in nearly	2 minutes	4 minutes	8 minutes	16 minutes
14	Which of the following is not a vector quantity?	speed	velocity	torque	displacement
15	Which launching vehicle is used in the launch of Chandrayaan-3?	GSLV	ASLV	PSLC	SLV
16	Anemia is caused due to deficiency of	Iron	Iodine	Calcium	Zinc
17	Which of the following substances act as fuel in the human body?	Protein	Carbohydrate	Vitamin	Water
18	Which one of the following is not a function of the liver?	Regulation of blood sugar	Enzyme activation	Detoxification	Reproduction

19	Name the corona virus that kills human	AIDS	FAIDS	SARS-CoV-2	HIV
20	The first case of novel coronavirus was identified in	Beijing	Shanghai	Wuhan, Hubei	Tianjin
21	……………… is the electrolyte used in Li-ion battery	Lithium based gel	Cobalt	Sulfur di oxide	None of the above
22	Which technique is commonly used for the fabrication of nanoparticles?	Sedimentation	Filtration	Distillation	Lithography
23	What is the second hardest material known?	Coke	Carborundum	Graphite	Diamond
24	Emulsion Paints contain	Nitro cotton	Zinc white	White lead	Polyvinyl acetate
25	Calcium sulphate is present in ordinary cement in the form of _____	Lime	Alumina	Gypsum	Magnesia

SECTION B- PHYSICS

1	A student plots V-I graphs for three samples of nichrome wire with resistances R1, R2 and R3. Choose from the following the statements that holds true for this graph		$R_1 > R_2 > R_3$	$R_3 > R_2 > R_1$	$R_2 > R_1 > R_3$
2	A cylindrical conductor of length l and uniform area of cross section A has resistance R. The area of cross section of another conductor of same material and same resistance but of length 2l is	A/2	3A/2	2A	3A
3	If semiconductor A has a knee voltage of 0.7 V, whereas semiconductor B has a knee voltage of 0.3 V, then:	A is silicon, B is germanium	A is germanium, B is silicon	A is germanium arsenide, B is silicon	A is silicon, B is germanium arsenide
4	The energy gap of insulators is	0 V	1 V	6 V	None of the above
5	If temperature of pure semiconductor increases, resistivity	increases	decreases	zero	infinity
6	What is the addition of the binary number 101001+ 010011=?	010100	111100	000111	101110
7	The absorptive power of a perfectly black body is-	0.5	1	zero	infinity
8	When water vapour condenses into water, the entropy	Increases	Decreases	Remain unchanged	First decreases and then increases
9	A Carnot cycle consist of	only one operation	two operations	three operations	four operations
10	The proton is 1836 times heavier than electron. The coulomb's force of repulsion between two protons at a certain distance between them is F. then the Coulomb force between two electrons for the same distance would be	F	−F	F/(1836)2	F×(1836)

#	Question	A	B	C	D
11	At a point on the axis of an electric dipole	The electric field is zero	The electric potential is zero	Neither the electric field nor the electric potential is zero	The electric field is directed perpendicular to the axis of the dipole
12	The magnetic field inside a solenoid is	Directly proportional to its length	Directly proportional to current	Inversely proportional to the total number of turns	Inversely proportional to current
13	Which of the following properties show that light is a transverse wave	Reflection	Interference	Diffraction	Polarization
14	The inverse square law of intensity (i.e., the intensity α 1/r2) is valid for a:	Point source	Line source	plane source	cylindrical source
15	Light from a point source in air falls on a spherical glass surface (n = 1.5 and radius of curvature = 20 cm). The distance of the light source from the glass surface is 100 cm. At what position the image is formed?	20 cm	50 cm	100 cm	62.5 cm
16	Two waves of same amplitude interfere in an optical experiment. If the intensity of the light is I0 then what will be the possible range of the resultant light after interference?	0 to I_0	0 to $2I_0$ 0 to 2I0	0 to $3I_0$	0 to $4I_0$
17	A particle of mass m is moving in the x,y plane such that its velocity at a point (x,y) is given as $\vec{v}=\alpha$ ($y\hat{x}+2x\hat{y}$), where α is a non-zero constant. What is the force $\vec{F}$ acting on the particle?	$\vec{F}=2m\alpha^2$ ($x\hat{x}+y\hat{y}$)	$\vec{F}=m\alpha^2$ ($y\hat{x}+2x\hat{y}$)	$\vec{F}=2m\alpha^2$ ($y\hat{x}+x\hat{y}$)	$\vec{F}=m\alpha^2$ ($x\hat{x}+2y\hat{y}$)
18	A particle undergoes uniform circular motion. About which point on the plane of the circle, will the angular momentum of the particle remain conserved?	Centre of the circle	Inside the circle	On the circumference of the circle	Outside the circle
19	A large number of free electrons exist in	Semiconductors	Metals	Insulators	Non-metals
20	The electrons in the third orbit of an atom have ……energy than the electron in the second orbit.	More	Less	Same	None of the above
21	At room temperature, an intrinsic silicon crystal act approximately as	A battery	A conductor	An insulator	A piece of copper wire

22	Holes are majority charge carriers in	Intrinsic semiconductor	Ionic solid	p-type semiconductor	Metals
23	Who discovered atomic nucleus	Ernest Rutherford	Robert Brown	Theodor Schwann	Matthias Jakab
24	When a pentavalent impurity is added to a pure semiconductor, it becomes	An insulator	An intrinsic semiconductor	p-type semiconductor	n-type semiconductor
25	In a semiconductor, current conduction is due to	Only holes	Only free electrons	holes and free electrons	None of the above

SECTION C- CHEMISTRY

1	What is the chemical formula of acid present in vinager	CH_3CH_2COOH	$HCOOH$	CH_3COOH	H_2SO_4
2	In volumetric analysis, the point at which the indicator changes color is called	The neutralization point	The end point	The equivalence point	Titration
3	Which is not present in Grignard reagent?	Methyl group	Magnesium	Halogen	–COOH group
4	The electronic configuration of an atom M is 1s2, 2s2, 2p6, 3s2, 3p6, 3d10, 4s2, 4p5, The chemistry of M is, therefore likely to be similar to that of	Boron	Oxygen	Nitrogen	Chlorine
5	A crystal will be hard and have high melting point	Covalent crystal	Ionic	Metallic	Molecular
6	Pick the molecule which has zero dipole moment	NH3	H2O	BCl3	SO2
7	The alcohol which does not react with Lucas reagent is	isobutyl alcohol	n-butanol	tert-butyl alcohol	sec-butyl alcohol
8	The compound obtained by the reaction of ethene with diborane followed by hydrolysis with alkaline H_2O_2 is	Ethanol	Propanol	Ethanol	triethyl bromide
9	Titration is	Titrimetric analysis	Volumetric analysis	Gravimetric analysis	All of these
10	Resonating structure of molecules have:	Identical bonding	Different bonding	Identical arrangement of atoms and nearly same energies	The different number of paired and unpaired electrons.
11	Which of the following is not a planar molecule:	$CH_2 = C = CH_2$	$CH_2 = C = C= CH2$	$CH_2 = C = O$	NC - HC = CH- CN
12	According to Huckel's rule a cyclic conjugated polyene is aromatic if it contains.	(4n+1) Π-electron	(4n+2) Π-electron	(2n+1) Π-electron	(4n) Π-electron
13	Picric acid is yellow coloured compound its chemical name is:	2,4,6 trinitrophenol	2,4,6 trinitrotoluene	m-nitrobenzoic acid	trinitroaniline
14	$C_6H_5N_2Cl$ + CuCl/ HCl + Heat→ C_6H_5Cl + N_2 + CuCl is a:	Wurtz reaction	Gattermann reaction	Friedel craft reaction	Sandmeyer reaction

15	Decreasing order of basicity of the three isomer of nitroaniline is :	p-nitroaniline > o-nitroaniline > m-nitroaniline	p-nitroaniline > m-nitroaniline > o-nitroaniline	m-nitroaniline > p-nitroaniline > o-nitroaniline	m-nitroaniline > o-nitroaniline > p-nitroaniline
16	Which of the following is not a function of enzymes?	Catalyzing chemical reactions	Regulating metabolic pathways	Providing structural support	Facilitating biochemical processes
17	Which of the following factors can affect enzyme activity?	pH	Temperature	Substrate concentration	All of the above
18	A piece of metal is 3 inch (represented by in) long. What is its length in cm?	6.72	7.5	7.62	3.0
19	Calculate the molarity of NaOH in the solution prepared by dissolving its 4 g in enough water to form 250 mL of the solution	4.0 M	0.4 M	0.2 M	2.0 M
20	Hund's Rule, what is meant by "maximum multiplicity"?	Maximizing the number of electrons in the outermost shell	Maximizing the number of unpaired electrons in a subshell	Maximizing the number of paired electrons in a subshell	Maximizing the number of electron orbitals
21	Which of the following conditions indicates a spontaneous process?	$\Delta G < 0$	$\Delta G = 0$	$\Delta G > 0$	$\Delta G = \Delta H - T\Delta S$
22	In a chemical equilibrium, which of the following statements is true?	The rate of the forward reaction is always greater than the rate of the reverse reaction.	The concentration of products remains constant over time.	The forward and reverse reactions have stopped.	The rates of the forward and reverse reactions are equal.
23	Which of the following is not a characteristic of crystalline solids?	Long-range order	Definite melting point	Amorphous structure	Regular repeating pattern
24	Ozone in the atmosphere is present in:	Troposphere	Stratosphere	Mesosphere	Thermosphere
25	Which law states that mole fraction of solute equals the relative lowering in vapour pressure for a dilute solution	Dalton's law	Raoult's law	Henry;s law	Avogados law

SECTION E- COMPUTER SCIENCE

1	What does CPU stand for?	Central Processing Unit	Central Program Unit	Central Power Unit	Central Peripheral Unit
2	Which of the following is the smallest unit of data in a computer?	Bit	Byte	Nibble	Word

3	Which data structure uses LIFO (Last In First Out) principle?	Queue	Stack	Array	Linked List
4	What does URL stand for?	Uniform Resource Locator	Uniform Resource Link	Universal Resource Locator	Universal Resource Link
5	Which protocol is used for secure communication over the internet?	HTTPS	HTTP	FTP	SMTP
6	Which of the following is a web browser?	Google	Mozila firefox	Bing	Yahoo
7	What is the main function of a modem?	To store data	To connect to the internet	To process data	To display output
8	Which of the following is used to connect a computer to a local network?	Ethernet cable	USB Port	VGA Cable	HDMI Cable
9	What is malware?	A type of software	A type of hardware	A type of malware	A type of malicious software
10	What does antivirus software do?	Increases computer speed	Detects and removes malware	Repairs hardware issues	Manages files
11	What is phishing?	A technique to speed up a computer	A method to steal personal information	A way to enhance network security	A tool for software development
12	What does a firewall do?	Cools down the computer	Protects against unauthorized access	Stores backup data	Manages internet connections
13	What is the full form of WAN?	Wide Area Network	Wireless Area Network	Web Area Network	Wired Area Network
14	Which of the following is not an application software?	Adobe Photoshop	Google Chrome	Windows 10	MS Paint
15	Which of the following is the correct format specifier for printing a float value?	%d	%c	%f	%lf
16	What is the size of an int data type in C (assuming a 32-bit system)?	1 byte	2 byte	4 byte	8 byte
17	Which of the following is a feature of object-oriented programming in C++?	Encapsulation	Abstraction	Polymorphism	All of the above
18	Which keyword is used to create an object in C++?	class	object	new	create
19	Which of the following is used to define a constant in C++?	const	static	define	final
20	Which of the following is not a valid data type in C++?	int	float	real	double
21	Which device is used to connect multiple devices in a network and operates at the data link layer?	Router	Hub	Switch	Repeater

22	Which of the following is a primary key?	A unique identifier for each record in a table	A field that contains duplicate values	A field used to store large objects	A key used to encrypt data
23	Which SQL command is used to retrieve data from a database?	UPDATE	DELETE	SELECT	INSERT
24	What is the binary representation of the decimal number 10?	1010	1100	1001	1111
25	In Boolean algebra, what does the expression A + 1 equal?	A	0	1	A'

SECTION F- BIOLOGICAL SCIENCE

1	The most abundant biomolecules on the earth is	Proteins	Carbohydrates	Lipids	Nucleic acids
2	The cyanobacteria are also referred to as	Protists	Pseudobacteria	Slime moulds	Blue-green algae
3	The major component of cell wall of most fungi is	Peptidoglycan	Cellulose	Hemicellulose	Chitin
4	The nucleic acid polymers in bacterial chromosomes are	Linear DNA molecule	Circular DNA molecule	Linear RNA molecule	Circular RNA molecule
5	The stored food material in fungi is	Glucose	Sucrose	Starch	Glycogen
6	The genetic material of Human Immuno Deficiency Virus (HIV) is	Double stranded DNA	Single stranded DNA	Double stranded RNA	Single stranded RNA
7	The component of blood responsible for producing antibodies is	Erythrocytes	Thrombocytes	Lymphocytes	Monocytes
8	Cell organelles containing hydrolytic enzyme is	Lysosome	Ribosome	Mesosome	Peroxisome
9	Which of the following organelle has its own DNA	Ribosome	Lysosome	Peroxisome	Mitochondria
10	The process which makes major difference between C3 and C4 plants is	Respiration	Photorespiration	Transpiration	Photosynthesis
11	Which of the following is not a secondary metabolite in plants	Morphine	Curcumin	Glucose	Rubber
12	Adenosine triphosphate (ATP) is a	Purine	Pyrimidine	Nucleoside	Nucleotide
13	The end product of glycolysis is	Pyruvic acid	Acetyl CoA	Glucose-1-phosphate	Uric acid
14	The end products of aerobic respiration are	Sugar and Carbon dioxide	Oxygen and energy	Carbon dioxide and energy	Carbon dioxide, water and energy
15	Nicotine acts as a stimulant, because it mimics the effect of	Dopamine	Thyroxine	Acetylcholine	Oxytocin
16	Blood cancer is also known as	Sarcoma	Lymphoma	Melanoma	Leukemia
17	In meiosis, crossing over occurs at	Leptotene	Zygotene	Pachytene	Diplotene

18	Which of the following ecosystem has the maximum biomass	Forest ecosystem	Grassland ecosystem	Pond ecosystem	Lake ecosystem
19	Which of the following is not a functional unit of an ecosystem	Energy flow	Productivity	Decomposition	Stratification
20	The pyramid which cannot be inverted in a stable ecosystem is	Biomass	Energy	Number	None of these
21	Acid rain is caused by increase in the atmospheric concentration of	CO and CO_2	SO_3 and NO	O_3 and Dust	SO_2 and NO_2
22	Increase in the concentration of toxicants at successive tropic levels is known as	Bioremediation	Biomagnification	Biosphere	Biotransformation
23	The rate of photosynthesis is higher in	Red light	Green light	Yellow light	Orange light
24	The organism used for alcohol fermentation is	*Aspergillus*	*Saccharomyces*	*Pseudomonas*	*Penicillium*
25	The maximum proportion of Biogas is	Hydrogen	Carbon dioxide	Methane	Butane

CHEMISTRY

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