International Islamic University Chittagong
Faculty of Science and Engineering
Admission Test I, Spring-2023

Physics (25×1=25)

1 The ratio between phase difference to path difference will be…
(a) $2\pi/\lambda$ (b) λ/π (c) $\lambda/2\pi$ (d) $2\lambda/\pi$

2 The value of two vectors is 5 unit each, and they are acting at the same point maintaining 120^0 angle between them. What will be the value of their resultant vector?
(a) 5 unit (b) 0 unit (c) 25 unit (d) 15 unit

3. A force of 10 N acts on a body for 5s. What is the change of momentum?
(a) 2 $Kgms^{-1}$ (b) 5 $Kgms^{-1}$ (c) 10 $Kgms^{-1}$ (d) 50 $Kgms^{-1}$

4. A body is projected at 45º angle with the horizon at 8 mile/sec velocity. What is horizontal range.
(a) 6.53 mile (b) 1.313 mile (c) 2.53 mile (d) Infinity

5. The dimension of momentum is
(a) $[ML^{-1}]$ (b) $[MLT^{-2}]$ (c) $[MLT^{-1}]$ (d) $[ML^{-1}T^{-1}]$

6. Black hole is a…
(a) Comet (b) Collapsed Star (c) Galaxy (d) Planet

7. 6 amp- 220 volt is marked in the main meter of a house. How many bulbs of 60 watts can safely be used in that house?
(a) 18 (b) 20 (c) 22 (d) 24

8. The value of escape velocity on Mars surface?
(a)11.2 kms^{-1} (b) 11.2 km/hour (c) 5.1 kms^{-1} (d) 5.1km/hour

9. Which one is a non-conservative force?
(a) Gravitational force (b) Frictional force (c) Magnetic force (d) Electrical force

10. Which of the following is not a vector?
(a) Electric intensity (b) Force (c) Weight (d) Energy

11. A sphere of rotating brass of mass 50gm is at distance from the rotating axis 2m. Find the moment of inertia about the axis?
(a) 0.5 kgm^2 (b) 0.2 kgm^2 (c) 0.8 kgm^2 (d) 0.4 kgm^2

12. The dimensional equation of power is
(a) $[MLT^{-2}]$ (b) $[ML^2T^{-3}]$ (c) $[ML^2T^{-2}]$ (d) $[ML^3T^{-3}]$

13. The charge 10C is given to capacitor at 20V. The energy will be
(a) 3.15×10^{11} Nm^{-2} (b) 3×10^{10} Nm^{-2} (c) 4×10^{9} Nm^{-2} (d) 2.8×10^{10} Nm^{-2}

14. A step-up transformer transfers 200V to 2000V. If number of turns is primary winding be 200. Find the number of turns in secondary winding?
(a) 10 (b) 400 (c) 4000 (d) 2000

15. Who is the discover of electromagnetic induction?
(b) Oersted (b)Farady (c) Lenz (d) Henry

16. 1Kwh = ?
(a) 3.6×10^6 J (b) 36×10^5 J (c) 3.6×10^7 J (d) 36×10^8 J

17. What is the curie temperature of iron?
(a) 770º C (b) 720º C (c) 790º C (d) 707º C

18. The Young modulus of a wire is 2×10^{11} Nm^{-2}. Find the applied stress in order to increase the length of the wire by 15%.
(a) 3.15×10^{11} Nm^{-2} (b) 3×10^{10} Nm^{-2} (c) 4×10^9 Nm^{-2} (d) 2.8×10^{10} Nm^{-2}

19. The efficiency of heat engine is 80%. The temperature of the heat sink is 127º C. What is the temperature of the heat source?
(a) 1500 K (b) 2000 K (c) 2300 K (d) 1800 K

20. If an astronaut can travel with a velocity greater than the velocity of light, what will be the impact of his time travel?
(a) he can travel to the future time (b) he can travel to the previous time
(c) there will be no change in this travel time (d) none of the above

21. A sound wave travels a distance 1020m in 3 minutes. If the wavelength of this sound wave is 50cm. what is the time period?
(a) 0.1 sec (b) 0.09 sec (c) 0.05 sec (d) 0.12 sec

22. The decay constant of a radioactive substance is $3.75\times10^{-3}sec^{-1}$. Calculate its half life
(a) 180 sec (b) 184.8 sec (c) 186 sec (d) 190 sec

23. What is the resistance of a 60W – 220 V bulb?
(a) 807 Ω (b) 870 Ω (c) 820 Ω (d) 708 Ω

24. The diameter of circular coils 31.4×10^{-2}m and its number of turns is 400. For what amount of current flow in the coil, the magnetic field at the Centre of the coil will be 4×10^{-10} wbm^{-2}
(a) 2.5×10^{-7}A (b) 2×10^{-6}A (c) 3×10^{-7}A (d) 3.5×10^{-8}A

25. Unit of magnetic field intensity or flux density is
(a) Weber (b) Volt (c) weber/meter (d) Tesla

Chemistry (15×1=15)

1. How many electrons are there in ***l* = 1** sub-shell for **n = 3**?
(a) 8 (b) 18
(c) 6 (d) 32

2. Which one is the equation of Plank?
(a) $E = h\upsilon$ (b) $E = mc^2$
(c) $\lambda = h/mv$ (d) $\pi = cRT$

3. For a 1st order reaction $t_{1/2}$ = 10 min, what is its rate constant?
(a) 0.0693 min^{-1} (b) 0.693 min^{-1}
(c) 10.0693 min^{-1} (d) 10.0 min^{-1}

4. What is P^H of 0.002M H_2SO_4 solution?

(a) 2.70 (b) 4.20

(c) 2.40 (d) 3.00

5. Which unit of the concentration does not depend on temperature?

(a) Molarity (b) Molality

(c) Normality (d) Percent by volume

6. What is the shape of a molecule which is formed by sp^3d hybridization?

(a) Trigonal (b) Trigonal di-pyramidal

(c) Tetrahedral (d) Linear

7. Which one of the following compounds is known as laughing gas?

(a) NO (b) N_2O

(c) N_2O_3 (d) NO_2

8. Elements having same atomic weight but different proton numbers, those are known as-

(a) Isober (b) Isotope

(c) Isomer (d) Isotone

9. Which one is the Lewis acid?

(a) HNO_3 (b) H_2SO_4

(c) $AlCl_3$ (d) NH_3

10. A neutral atom can accept an electron to form an anion. This process involves

(a) loss of energy (b) gain of energy

(c) no change in energy (d) none of these

11. The covalent compounds are soluble in

(a) all acids (b) all bases

(c) all solvents (d) non-polar solvents

12. The types of bonds present in Sulphuric Acid molecules are

(a) only covalent (b) ionic and covalent

(c) co-ordinate and covalent (d) co-ordinate, covalent and ionic

13. The common feature among the molecules HF, H_2O, and HCl is

(a) intra-molecular H-bonding (b) inter-molecular H-bonding

(c) that they contain no polar bonds (d) that their dipole moment is zero

14. The electrical conductivity of metals is due to

(a) mobile protons is the nucleus (b) mobile nucleus in the nucleus

(c) mobile electrons in outer vacant spaces (d) none of these

15. Which one of the following is the most polar

(a) H — F (b) H — Cl (c) H — Br (d) H — I

Mathematics (30×1=30)

1. What is the Trace of the matrix $\begin{pmatrix} 2 & i & 4 \\ 7 & 8 & 5 \\ 9 & 3 & 1 \end{pmatrix}$

(a) i (b) $-i$ (c) 11 (d) 21

2. If $\begin{pmatrix} 1 & 1 \\ 3 & y \end{pmatrix} \begin{pmatrix} x \\ 1 \end{pmatrix} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$, then the value of x and y is:

(a) -3, 8 (b) -8, 3 (c) none (d) 3,-8

3. Find the projection of the vector $\boldsymbol{A = 2i + 2j + k}$ on the vector $\boldsymbol{B = 6i - 3j + 2k.}$

(a) $\frac{8}{7}$ (b) $\frac{7}{8}$ (c) $\frac{8}{5}$ (d) $\frac{5}{8}$

4. Find the equation of a straight line which is parallel Y axis and pasing through The intersecting point of the straight lines $2x - 3y + 4 = 0$ and $8x + 3y - 6 = 0$.

(a) $3x + 5 = 0$ (b) $5x - 1 = 0$ (c) $4x + 9 = 0$ (d) $3x - 1 = 0$

5. If y =sin(x), then what is the value of $\frac{d^4y}{dx^4}$

(a) cos(x) (b) sin(x) (c) 4sin(x) (d) $\sin(x)^4$

6. What is the polar co-ordinate of $3 + \sqrt{3}\,i$

(a) $(2\sqrt{3}, \frac{\pi}{3})$ (b) $(2\sqrt{3}, \frac{\pi}{6})$ (c) $(4\sqrt{3}, \frac{\pi}{3})$ (d) $(4\sqrt{3}, \frac{\pi}{6})$

7. For what condition, $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = o$ represents a circle?

(a) $a = 0, b = 0$ (b) $a = b,\ h = 0$ (c) $a = b, h \neq 0$ (d) $a \neq 0, b = 0$

8. Which is correct?

(a) $n_{C_0} = 1$ (b) $n_{C_1} = n$ (c) $n_{C_n} = 1$ (d) All of them

9. What is incorrect?

(a) $\cos 0 + i \sin 0 = 1$ (b) $\cos\pi + i \sin\pi = i^2$

(c) $\cos\frac{\pi}{2} - i \sin\frac{\pi}{2} = -i$ (d) $\cos\frac{\pi}{2} + i \sin\frac{\pi}{2} = 0$

10. If $\sin\theta = 1$ then θ =?

(a) $(4n-1)\frac{\pi}{2}$ (b) $(4n+1)\frac{\pi}{2}$ (c) $(2n-1)\frac{\pi}{2}$ (d) $(4n+1)\frac{\pi}{2}$

11. If $y = \sqrt{x + \sqrt{x + \sqrt{x \ldots \ldots \infty}}}$ then, $\frac{dy}{dx}$ =?

(a) $\frac{1}{1-2y}$ (b) $\frac{1}{2y-1}$ (c) 0 (d) Undetermined

12. If $y = \frac{sinx+cosx}{\sqrt{1+sin2x}}$ then $\frac{dy}{dx}$ =?

(a) 0 (b) 1 (c) $sinx + cosx$ (d) None of them

13. If $x = a(\theta - sin\theta)\ and\ y = a(1 - cos\theta)\ then\ \frac{dy}{dx}$ =?

(a) $sin\frac{\theta}{2}$ (b) $cos\frac{\theta}{2}$ (c) $cot\frac{\theta}{2}$ (d) $tan\frac{\theta}{2}$

14. $If\ y = x^n\ then\ \frac{d^{n+1}y}{dx^{n+1}}$ =?

(a) 1 (b) 0 (c) -1 (d) Undefined

15. $If\ \ x = \frac{e^{2lny}}{y}\ \ then\ \ \frac{dy}{dx} = ?$

(a) 1 (b) 0 (c) -1 (d) Undefined

16. $\int_0^1 \frac{\cos^{-1} x}{\sqrt{1-x^2}}\, dx = ?$

(a) $\frac{\pi}{8}$ (b) $\frac{\pi^2}{8}$ (c) $\frac{\pi}{4}$ (d) $\pi/2$

17. $\int \frac{dx}{x^2+a^2} = ?$

$(a)\ \frac{1}{a}\tan^{-1}\frac{x}{a} + C$ (b) $\frac{1}{a}\tan^{-1}\frac{a}{x} + C$ (c) $\frac{1}{a}\tan^{-1}\frac{x}{a}$ (d) $\frac{1}{a}\tan^{-1}\frac{a}{x}$

18. $5_{C_0} + 5_{C_1} + 5_{C_3} + 5_{C_4} + 5_{C_5} = ?$

(a) 32 (b) 22 (c) 19 (d) 15

19. How to regroup the word $DIGITAL$ in different way where the vowel will be in together in each regroup of the arrangement.

(a) 360 (b) 300 (c) 310 (d) 320

20. Find the total combination of the any 4 letters from the word $THESIS$.

(a) 10 (b) 11 (c) 12 (d) 14.

21. Find the values of k such that roots of the equation $(k+1)x^2 + 4(k-2)x + 2k = 0$ will be equal.

(a) -4 (b) 4 (c) -8 (d) 8

22. $sin \cos^{-1} tan \cos^{-1} x = ?$

(a) $\frac{\pi}{2}$ (b) x (c) $\sqrt{x}$ (d) $\sqrt{1-x^2}$

23. What is the binary form of $(1237)_{10}$?

(a) $(10011010100)_2$ (b) $(10011010110)_2$ (c) $(10011010101)_2$ (d) None of them

24. Three forces 1N, 2N and 3N are acting on a point and make equilibrium. What is the angle between 1st two forces?

(a) 45^0 (b) 90^0 (c) 120^0 (d) 60^0

25. What is the value of force which acting 6 sec upon a stone of 40 kg weight for which it's velocity will be 18 m/s.

(a) 120N (b) 24N (c) 12N (d) 60N

26. If $f(x) = \sin x\ , g(x) = x^2$ then $f\left(g\left(\frac{\sqrt{\pi}}{2}\right)\right) = ?$

(a) $\frac{\sqrt{2}}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) 2 (d) $\frac{1}{2}$

27. If $f(x) = 3e^{x^2}$ then $f'(x) - 2xf(x) + \frac{1}{3}f(0) - f'(0) = ?$

(a) 0 (b) 1 (c) -1 (d) None

28. If an integer number is chosen between the numbers 26 to 50 then what is the probability of that number will be prime number?

(a) $\frac{1}{25}$ (b) $\frac{19}{25}$ (c) $\frac{1}{7}$ (d) $\frac{6}{7}$

29. If two forces $3p, 5p$ are acting on a particle, then what is their resultant force?

(a) $\sqrt{43}$ p (b) 15p (c) $\sqrt{34}$ p (d) 10p

30. If $x^n + y^n = a^n$ then of $\frac{dy}{dx}$ =?

(a) $\left(\frac{x}{y}\right)^n$ (b) $-\left(\frac{x}{y}\right)^{n-1}$ (c) $-\left(\frac{x}{y}\right)^n$ (d) $\left(\frac{x}{y}\right)^{n+1}$

English (15×1=15)

Reading Comprehension- 05

Read the passage and answer the following questions given below:

Muhammad ibn Musa al-Khwarizmi was a Muslim Mathematician, Astronomer, Astrologer Geographer, and scholar in the House of Wisdom in Baghdad. He was born in Persia of that time around 780. Al-Khwarizmi flourished while working as a member of the House of Wisdom in Baghdad under the leadership of Kalif al-Mamun, the son of Khalifa Harun al-Rashid. The House of Wisdom was a scientific research and teaching center. Al-Khwarizmi developed the concept of the algorithm in mathematics which is the reason for his being called the grandfather of computer science by many people. Al-Khwarizmi's algebra is regarded as the foundation and cornerstone of the sciences. To al-Khwarizmi we owe the world "algebra," from the title of his greatest mathematical work, Hisab al-Jabr wa-al-Muqabala. The book, which was twice translated into Latin, by both Gerard of Cremona and Robert of Chester in the 12th century, works out several hundred simple quadratic equations by analysis as well as by geometrical example. It also has substantial sections on methods of dividing up inheritances and surveying plots of land. It is largely concerned with methods for solving practical computational problems rather than algebra as the term is now understood. His most recognized work as mentioned above and one that is so named after him is the mathematical concept of Algorithms. Today, people use algorithms to do addition and long division, principles that are found in Al-Khwarizmi's text written about 1200 years ago. Al-Khwarizmi was also responsible for introducing the Arabic numbers to the West, setting in motion a process that led to the use of the nine Arabic numerals, together with the zero sign. Muhammad ibn Musa al-Khwarizmi died in c. 850 being remembered as one of the most seminal scientific minds of early Islamic culture.

1. Who was Muhammad ibn Musa al-Khwarizmi **1x5 = 05**

(a) Muslim Computer Scientist
(b) Muslim Mathematician
(c) Muslim Poet
(d) Muslim Electrical Engineer

2. What was the House of Wisdom?

(a) A place where old people lives
(b) A famous library in Baghdad where scientific books were archived
(c) A specialized place to perform scientific research
(d) Parliament of Khalifa Harun al-Rashid

3. Who is the grandfather of computer science?

(a) Khalif Al-Mamun
(b) Muhammad ibn Musa al-Khwarizmi
(c) Gerard of Cremona
(d) Ibn al-Haytham

4. What is the history behind the name 'Algorithm'
(a) It came from the word 'Alchemy'
(b) It came from the Greek word 'Arithmos'
(c) It was named after Al-Khwarizm
(d) It cannot be recalled from history

5. The greatest mathematical book 'Hisab al-Jabr wa-al-Muqabala (algebra)' focuses on
(a) Solving practical computational problems
(b) Number theory
(c) Linear Algebra
(d) Astronomy

Fill in the blanks by choosing appropriate word(s) from the given Option (6-15) **1x10 = 10**

6. I am used to _____ in queues.
(a) Stand (b) Standing (c) Stand up (d) Standing still

7. When I stepped ____ lift, I found it had stopped working.
(a) on (b) at (c) in (d) into

8. Out of the given options, choose the one which is the correct active voice of the sentence given below. By whom was the window broken?
(a) Who has broken the window? (b) Who breaks the window?
(c) Who broke the window? (d) Who had broken the window?

9. Out of the given options, choose the one which is the correct passive voice of the sentence given below. Roses smell sweet.
(a) Roses are smelling sweet. (b) Roses are sweet smelling when someone smells.
(c) Roses are sweet when smelt. (d) Roses are sweet when we smell.

10. Jamil requested Rahat to bring _____notebooks for him from the stationery.
(a)few (b)a few (c)the few (d) a little

11. The government is carrying _____test on growing genetically modified crops.
(a) from (b) in (c) away (d) out

12. Do you ever need to give a request? (Which word is a count noun?)
(a) ever (b) give (c) request (d) you

13. Plural subjective pronoun in the sentence "They will have a party all of their friends **are** invited." Is
(a) they (b) their (c) have (d) of

14. 'In a nutshell' means…….
(a) in brief (b) in details (c) in medium (d) none

15. Which one is singular?
(a) data (b) media (c) geese (d) agendum