

# VITEEE-2020 Sample Questions

Note: Please select the most appropriate choice from A, B, C and D. No negative marking

## MATHEMATICS

- For the system of equations  $x + ky + z = 0$ ,  $kx + 3y - kz = 0$ ,  $x - y - 3z = 0$  to have only the trivial solution,  $k$  cannot be equal to  
A) 2 and 3    B) -2 and 3    C) 2 and -3    D) -2 and -3
- How many positive numbers  $x$  satisfy the equation  $\cos(97x) = x$ ?  
A) 1    B) 15    C) 31    D) 49
- The locus of the mid-point of the focal chord of the parabola  $y^2 = 4x$  is a parabola, whose vertex is  
A) (0,0)    B) (1,0)    C) (0,1)    D) (1,1)
- If two forces of magnitude 7 and 50 units act in the directions  $3\hat{i} + 2\hat{j} - 6\hat{k}$  and  $9\hat{i} - 12\hat{j} + 20\hat{k}$  respectively on a particle moving it from the point  $A(1, 0, -3)$  to the point  $B(3, -2, -5)$ , then the work done by the forces is  
A) 14 units    B) 27 units    C) 18 units    D) 24 units
- One end-point of a diameter of the sphere  $x^2 + y^2 + z^2 - x - 2z = 1$  is  $(1, 1, 0)$ . Then the other end-point of the diameter will be  
A) (0, 1, 0)    B) (1, 1, 2)    C)  $(1, \sqrt{2}, 1)$     D) (0, -1, 2)
- $\lim_{x \rightarrow 0} (\cos x)^{1/x^2}$  is equal to  
A)  $e^{-1}$     B) 1    C)  $e$     D)  $e^{-1/2}$
- The bounded area cut-off by the line  $y - x + 4 = 0$  from the parabola  $y^2 = 2x$  is equal to  
A)  $\frac{8}{3}$     B)  $\frac{14}{3}$     C)  $\frac{40}{3}$     D) 18
- The general solution of the differential equation  $[\cos x \tan y + 2 \cos(x + y)] dx + [\sin x \sec^2 y + 2 \cos(x + y)] dy = 0$  is  
A)  $\cos x \tan y - 2 \cos(x + y) = C$     B)  $\cos x \tan y + 2 \cos(x + y) = C$   
C)  $\sin x \tan y - 2 \sin(x + y) = C$     D)  $\sin x \tan y + 2 \sin(x + y) = C$
- A pair of coins is tossed a fixed number of times. If the probability of getting both heads exactly 3 times is same as the probability of getting both heads exactly 4 times, then the number of trials is  
A) 7    B) 15    C) 21    D) 14
- Consider the following statements  
p : suman is brilliant  
q : suman is rich  
r : suman is honest  
The negation of the statement "suman is brilliant and dishonest if and only if suman is rich" is equivalent to  
A)  $(p \rightarrow r) \leftrightarrow q$     B)  $(r \rightarrow p) \leftrightarrow q$     C)  $p \rightarrow (r \leftrightarrow q)$     D)  $r \rightarrow (p \leftrightarrow q)$

## PHYSICS

- A rain drop of mass 0.1 g is falling with uniform speed of 10 cm/s. What is the net weight of the drop?  
[ $g = 10 \text{ m/s}^2$ ]  
A) 0 N    B)  $2 \times 10^{-3} \text{ N}$     C)  $10^{-2} \text{ N}$     D)  $10^{-3} \text{ N}$
- The equation of state corresponding to 8 g of  $\text{O}_2$  (assume ideal gas) is  
A)  $PV = 8RT$     B)  $PV = RT/4$     C)  $PV = RT/2$     D)  $PV = RT/8$
- Two very large sheets of plastic are facing each other with a distance 'd' between them. By rubbing them with wool and silk, the sheet on the left gets a uniform surface charge density  $n_1 = -n_0$  and the other sheet on the right gets  $n_2 = 3n_0$ , where  $n_0 > 0$ . What is the magnitude and direction of the electric field in the region between the two sheets?  
A)  $n_0/\epsilon_0$ , left    B)  $n_0/\epsilon_0$ , right    C)  $2n_0/\epsilon_0$ , left    D)  $2n_0/\epsilon_0$ , right
- The wire in the potentiometer has a resistance of  $R_0$  and the potentiometer is connected to a battery of voltage 'V'. Now a resistor 'R' whose value of resistance has to be measured is connected. When the sliding point is exactly in the middle of the potentiometer, the voltage drop across 'R' is  $V/4$ . What is the value of  $R/R_0$ ?  
A) 1/4    B) 4    C) 2    D) 1/2
- A charge of 1 C is placed at one end of a non-conducting rod of radius 0.4 m. The rod is rotated in a vertical plane about a horizontal axis passing through the other end of the rod with an angular frequency  $2\pi \times 10^4 \text{ rad/sec}$ . The magnetic field at a point on the axis of rotation at a distance 1 m from the center of the path is  
A)  $5.75 \times 10^{-5} \text{ T}$     B)  $6.88 \times 10^{-5} \text{ T}$     C)  $7.25 \times 10^{-5} \text{ T}$     D)  $8.08 \times 10^{-5} \text{ T}$
- In an LCR series circuit, the voltage across each of the components L, C and R is 50 V. The voltage across the LC combination will be  
A) 50 V    B) 10 V    C) 0 V    D) 30 V
- A convex meniscus lens is made from glass with refractive index  $n = 1.52$ . If the radius of curvature of the convex surface is 20 cm and that of the concave surface is 40 cm, then find out the focal length.  
A) 129 cm    B) 94 cm    C) 80 cm    D) 113 cm
- The work function of cesium is 2.14 eV. The threshold frequency for cesium is  
A)  $5.16 \times 10^{14} \text{ Hz}$     B)  $3.20 \times 10^{14} \text{ Hz}$     C)  $2.14 \times 10^{14} \text{ Hz}$     D)  $6.50 \times 10^{14} \text{ Hz}$
- The half life of radium is 1600 years. After how many years 25% of a radium block will remain undecayed?  
A) 3200 years    B) 1500 years    C) 2000 years    D) 5200 years
- Intrinsic Si at 300 K has equal electron ( $n_e$ ) and hole ( $n_h$ ) concentrations of  $1.5 \times 10^{16} \text{ m}^{-3}$ . Doping by indium increases  $n_h$  to  $4.5 \times 10^{22} \text{ m}^{-3}$ . The value of  $n_e$  in the doped Si is  
A)  $5.0 \times 10^9 \text{ m}^{-3}$     B)  $1.0 \times 10^9 \text{ m}^{-3}$     C)  $8.0 \times 10^9 \text{ m}^{-3}$     D)  $4.0 \times 10^9 \text{ m}^{-3}$

## CHEMISTRY

- As per the Bohr's model, the minimum energy (in eV) required to remove an electron from the ground state of doubly ionized Li atom ( $Z = 3$ ) is  
A) 1.51      B) 13.6      C) 40.8      D) 122.4
- The hybridization of **Xe** in **XeF<sub>4</sub>** is  
A)  $sp^3d$       B)  $dsp^2$       C)  $sp^3d^2$       D)  $sp^2d^3$
- The X-ray beam coming from an X-ray tube will be  
A) monochromatic  
B) having all wavelengths smaller than a certain maximum wavelength  
C) having all wavelengths larger than a certain minimum wavelength  
D) having all wavelengths lying between a minimum and a maximum wavelength
- Which one of the following causes increase in entropy?  
A) A liquid crystallizes into a solid  
B) Water vapor condensation into liquid  
C) Decomposition of  $NaHCO_3$  at  $102^\circ C$   
D) Diffusion of two similar gas mixture into each other in a closed container isolated from the surroundings
- The reaction that takes place at anode is  
A) ionization      B) reduction      C) oxidation      D) hydrolysis
- Which of the following statement(s) is/are correct about *trans*-1,2-dimethylcyclohexane?  
I. Two methyl groups can exist in diaxial orientation.  
II. Two methyl groups can exist in axial-equatorial or equatorial-axial orientation.  
III. Two methyl groups can exist in diequatorial orientation.  
A) I only      B) II only      C) I and II only      D) I and III only
- Find the correct order of their boiling points of the following alcohols:  
methanol, *n*-propyl alcohol, *iso*-propyl alcohol  
A) methanol < *n*-propyl alcohol < *iso*-propyl alcohol  
B) methanol > *n*-propyl alcohol > *iso*-propyl alcohol  
C) methanol < *iso*-propyl alcohol < *n*-propyl alcohol  
D) methanol > *iso*-propyl alcohol > *n*-propyl alcohol
- Reaction of \_\_\_\_\_ with Grignard reagent followed by hydrolysis yields ketone.  
A) esters      B) aldehyde      C) alkyl nitrile      D) acid chloride
- Benzoic acid can be prepared from toluene by treatment with  
A)  $KMnO_4$ -KOH      B) Grignard reagent in ether followed by dry ice and acid hydrolysis  
C) Tollens' reagent      D)  $HBr/KCN$  followed by acid hydrolysis
- The number of amino acid units present in insulin is  
A) 42      B) 51      C) 8      D) 32

## BIOLOGY

- Which of the following does not show segmented body plan?  
A) Arthropods      B) Annelids      C) Echinoderms      D) Chordates
- Synapsis occurs between  
A) mRNA and ribosomes      B) spindle fibre and centromere  
C) two homologous chromosomes      D) two heterologous chromosomes
- Gastrula has a pore which is known as  
A) zoospore      B) oospore      C) blastopore      D) gonophore
- The human genetic disorder caused by the presence of an extra X chromosome is called  
A) Klinefelter syndrome      B) Down syndrome      C) Turner syndrome      D) Marfan syndrome
- Interferon is a  
A) fat      B) protein      C) carbohydrate      D) nucleic acid
- The protein moiety of an enzyme is called as  
A) apoenzyme      B) coenzyme      C) cofactor      D) holoenzyme
- Which one of the following is not correct with C<sub>4</sub> plants?  
A) The primary acceptor of CO<sub>2</sub> is a 3 carbon compound  
B) The first stable product is a 4-carbon compound  
C) Two different cell types are involved  
D) Photorespiration occurs frequently
- Oxygen binding affinity to the haemoglobin is  
A) decreased by increase in pH      B) increased by increase in pCO<sub>2</sub>  
C) increased by increase in pO<sub>2</sub>      D) not affected by change in pH, pO<sub>2</sub> and pCO<sub>2</sub>
- Which one of the following techniques cannot be used for the measurement of organic matter in sewage?  
A) Chemical oxygen demand (COD)      B) Biochemical oxygen demand (BOD)  
C) Total organic carbon (TOC)      D) Membrane filtration technique (MFT)
- Study of population ecology is called  
A) autecology      B) demecology      C) demography      D) ethology

## ENGLISH

1. Read carefully the following lines of a poem and the question that follows. Choose the correct answer.

Therefore, on every morrow, are we wreathing

A flowery band to bind us to the earth

The poet uses the phrase “wreathing a flowery band” as \_\_\_\_\_

- A) A hyperbole      B) A metaphor      C) A personification      D) An epithet

2. Which of the following is the correct syllable division for the given word? Choose the correct answer.

Personification

- A) per-soni-fi-ca-tion      B) per-son-i-fi-ca-tion  
C) per-so-ni-fi-ca-tion      D) per-so-nif-i-ca-tion

## APTITUDE

1. A school has four sections A, B, C and D of Class IX students. The results of half-yearly and annual examinations are shown in the table given under:

Results	No of Students			
	Section A	Section B	Section C	Section D
Students failed in both the examinations	28	23	17	27
Students failed in half-yearly but passed in the annual examinations	14	12	8	13
Students passed in half-yearly but failed in the annual examinations	6	17	9	15
Students passed in both examinations	64	55	46	76

If the number of students passing an examination be considered as a criteria for comparison of difficulty level of the two examinations, which of the following statements is true in this context?

- A) Half-yearly examinations were more difficult.  
B) Annual examinations were more difficult.  
C) Both the examinations had almost the same difficulty level.  
D) The two examinations cannot be compared to difficulty level.
2. The variable C is an integer. Is C even?  
Statements:  
(a)  $C + 6$  is even  
(b)  $C - 5$  is odd
- A) If (a) alone is sufficient to answer the question.  
B) If (b) alone is sufficient to answer the question.  
C) If (a) and (b) together are necessary to answer the question.  
D) If either (a) or (b) is sufficient to answer the question.
3. If SAUCER is coded as TBVBDQ, how is TOWN coded?  
A) UPXO      B) PUOX      C) UPVM      D) UPYM
4. Two statements are followed by a few conclusions i, ii, iii and iv. Assume the given statements to be true, even if they seem to be at variance with commonly known facts and choose your answer from the given choices A, B, C and D.  
All bags are phones.  
Some batteries are phones  
Conclusions:  
i. All phones are bags.  
ii. All phones are batteries.  
iii. Some bags are phones.  
iv. Some bags are not batteries  
A) (iv) follows      B) (ii) follows      C) (iii) follows      D) (i) follows
5. An accurate clock shows 10 o'clock in the morning. Through how many degrees will the hour hand rotate when the clock shows 3 o'clock in the afternoon?  
A)  $144^\circ$       B)  $150^\circ$       C)  $168^\circ$       D)  $180^\circ$