

SUBJECT : INFORMATICS PRACTICES (SET-I)

Time : 3 Hrs.

M.M.: 70

General Instructions :(i) **The question paper contains 7 questions. All are compulsory.**(ii) **Relational Database Management System-MySQL.**

- Q1. (a) What do you mean by secondary storage devices? Give any two examples. (2)
- (b) Write the difference between serial and USB port. (2)
- (c) What is the purpose of the following devices? (2)
- (i) Speakers (ii) Plotters
- (d) Give the full form of OCR. (1)
- (e) What role do input devices play in a computer system? Give examples of some input devices. (2)
- (f) Name the parts of CPU. (1)
- Q2. (a) Write any two functions of operating system. (1)
- (b) What do you mean by BIOS? (2)
- (c) What is the use of back up utility software? (2)
- (d) Explain the term system software with the help of suitable examples. (2)
- (e) Define multiuser operating system. (1)
- (f) What are the uses of payroll management system? (2)
- Q3. (a) Define the following terms : (2)
- (i) Firewall (ii) CAPTCHA
- (b) What is a worm? (1)
- (c) What is cyber crime? Give four examples. (2)
- (d) Define antivirus software. (2)
- (e) Explain the usage of digital signature. (2)
- (f) What is the need of social networking? (1)
- Q4. (a) Write the command to display the structure of the table "School". (1)
- (b) Differentiate between Alter and Delete command with the help of an example. (2)
- (c) Explain the two wildcard symbols used with LIKE operator with the help of an example. (2)

- (d) Write the command to increase the marks by 5 of all students in the marks column of table "Student". (2)
- (e) Write the set of commands to display all the tables in the database "University". (2)
- (f) Define Primary key. (1)
- Q5. Write MySQL commands for the following based on the table STAFF. (10)

SID	FNAME	LNAME	ADDRESS	CITY
152	Sam	Tones	33 Elm St	Paris
189	George	Smith	83 First Street	Howard
300	Robert	Samuel	9 Fifth Cross	Washington
315	Manila	Sharan	2 Friends Colony	New Delhi
427	Mary	Jones	842 Vine Ave.	Canada
678	Peter	Thompson	12 Moore Street	Boston
690	Henry	Williams	440 USI 10	Upton

- (a) To display Fname, Lname, address and city of all employees living in Paris.
- (b) To display the fname of all employees in ascending order.
- (c) To display SID and Lname of all employees.
- (d) To display the Lname and city where city name starts with letter 'C'.
- (e) To display fname of all employees whose SID is between 300 to 500.
- (f) To display size of each address.
- (g) To display each lname in capital letters.
- (h) To display all information of those employees whose city is 'Boston', 'Paris' or 'Washington'.
- (i) To display first two letters of Lname of all employees.
- (j) To display each address in small letters.
- Q6. (a) Aman has created a table "library" that has 6 columns and 13 records. What is the degree and cardinality of the table, after adding two records and deleting two columns? (2)

- (b) Write the output of the following queries : (4)
- Select instr("CBSE Examination", "Exam")
 - Select right("Testing", 4);
 - Select mid("Computer", 4, 3);
 - Select round(67.549, 1);
- (c) Write MySQL statements to do the following : (4)
- Extract the string "STEM" from the string "SYSTEM".
 - To display the year part of the date "21 May 2016".
 - To display the number of letters in "DESIGN".
 - To display the current date and time.

Q7. (a) Write MySQL command to create the table "BOOK" with the following specifications : (2)

Field Name	Date Type	Size	Constraints
BookNo	Numeric	6	Primary Key
BookName	Varchar	100	
Category	Varchar	50	
Price	Numeric	6	
Quantity	Numeric	6	
Publisher	Varchar	100	

- (b) Write command to add following record in BOOK table:
1001, "Mastering Physics", "Science", 200, 10, "Laxmi Publ." (1)
- (c) Write the command to increase the price by 100 for bookno 1004. (1)
- (d) Write the command to delete all the records, whose Bookname starts with the letter "M". (1)
- (e) Write the command to add a new column "Author" with datatype as Varchar and size 30. (1)
- (f) Write the command to delete all the records. (1)
- (g) Write the command to delete the whole table. (1)
- (h) What are DML commands? Give two examples. (2)

FT-F

9/2016

SUBJECT : BIOLOGY

Time : 3 hrs.

M.M. : 70

General Instructions :

- (i) *There are 26 questions and 5 sections in the question paper. All questions are compulsory.*
- (ii) *Section-A contains question number 1 to 5, very short answer type questions of one mark each.*
- (iii) *Section-B contains question number 6 to 10, short answer type-I questions of 2 marks each.*
- (iv) *Section-C contains question number 11 to 22, short answer type-II questions of 3 marks each.*
- (v) *Section-D contains question number 23, value based question of 4 marks.*
- (vi) *Section-E contains question number 24 to 26, long answer type questions of 5 marks each.*
- (vii) *There is no overall choice in the question paper, however, an internal choice is provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks. In these questions, an examinee is to attempt any one of the two given alternatives.*

SECTION-A

- Q1. 'X' is a taxonomic category which is an assemblage of families. Identify 'X'. Give an example. (1)
- Q2. Which type of scales form the exoskeleton in Chondrichthyes? Name another structure in the body of these fishes which is made from these scales. (1)
- Q3. Define hydroponics. (1)
- Q4. What is middle lamella made up of? Mention the function that it performs in a cell. (1)
- Q5. What is the value of water potential of pure water? (1)

SECTION-B

- Q6. What is imbibition? State the usefulness of imbibition to seed germination.

OR

What is plasmolysis? Under what conditions does a cell become plasmolysed? (2)

Q7. Answer the following with respect to Phylum Porifera:

(a) Water enters into their bodies through tiny pores called 'P' and moves out through 'O'. Identify 'P' and 'O'.

(b) Comment on the type of skeleton that supports the body of these animals. (2)

Q8. Complete the given table : (2)

Classes	Common Name	Major Pigments
<u>K</u>	Brown algae	Chlorophyll a, (b), <u>L</u>
Rhodophyceae	<u>M</u>	Chlorophyll a, d, <u>N</u>

Q9. Describe the Kranz anatomy seen in C_4 plants. (2)

Q10. (a) The given figure shows the primary structure of a protein. What do 'N' and 'C' represent in this figure?

N C

(b) Name the chemical bond with links individual amino acids to form a protein chain. (2)

SECTION-C

Q11. Describe the sexual cycle in fungi. (3)

Q12. Schematically represent the phases of cell cycle in a typical eukaryotic cell. Explain the changes occurring in the cell during interphase stage of cell cycle. (3)

Q13. How do the following factors affect enzymatic activity?

(a) Temperature

(b) Concentration of substrate (3)

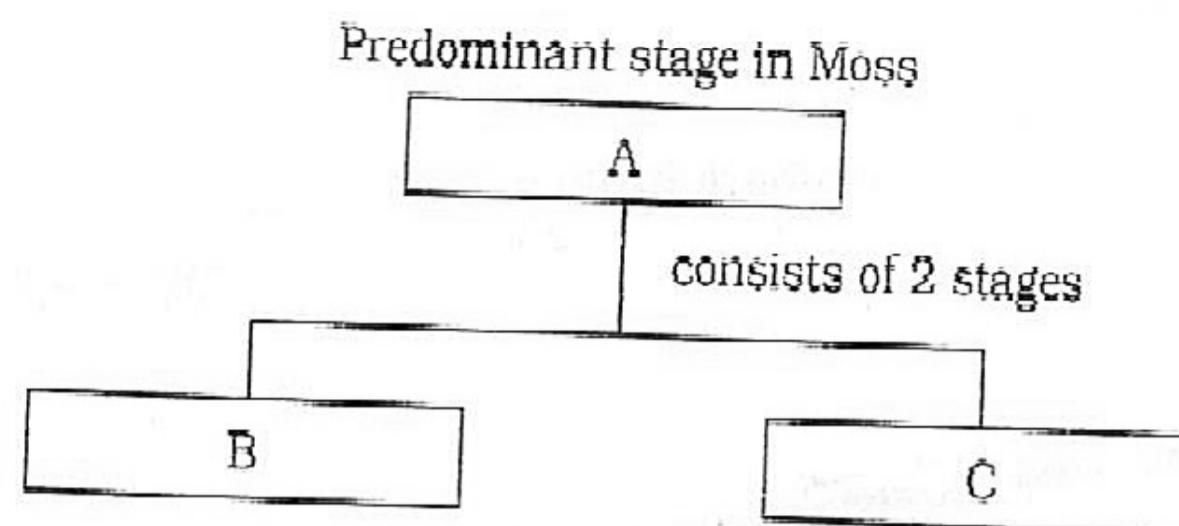
Q14. Describe the structure of the organelle called the 'Powerhouse of the cell'.

OR

Explain the 'Fluid Mosaic Model' of plasma membrane. (3)

(2)

- Q15. A cell has diploid chromosome number equal to 6. Represent this cell in metaphase of Mitosis. (3)
- Q16. Complete the given flowchart. Also describe stage 'C'. (3)



- Q17. What is critical concentration with respect to deficiencies of essential elements in plants. How are deficiency symptoms related to the mobility of the element in the plant? (3)
- Q18. State the law of limiting factors of Photosynthesis. How would the rate of photosynthesis be affected if water in the soil becomes limiting? (3)
- Q19. What forms a basis for biological classification? Mention the significance of creation of botanical gardens and zoological parks. (3)
- Q20. Name the two pathways of transport of water in roots of plants. Explain any one of them. (3)
- Q21. Why all minerals cannot be passively absorbed by roots? How does uptake of minerals take place into the roots from the surrounding soil? (3)
- Q22. Draw a well labelled diagram to show the internal structure of a cillum. (3)

SECTION-D

- Q23. Fungi are saprotrophs, parasites and symbionts. They show a great diversity in morphology and habitat, in some the fruiting bodies are macroscopic, while many others are microscopic.
- (a) Give an example of fungus where the fruiting body is macroscopic and edible.

(3)

- (b) Which fungus is important for the baking and brewing industry?
(c) What value is learnt from symbionts? Give two examples where fungi are found as symbionts. (4)

SECTION-E

- Q24. (a) Name the first stable product of C_3 and C_4 cycle respectively.
(b) List the differences between Cyclic and Non cyclic Photophosphorylation.

OR

- (a) Schematically represent the Nitrogen Cycle in nature.
(b) Describe the components of nodules in the roots of leguminous plants. (5)
- Q25. (a) What is haplo-diplontic life cycle? Name the group of plants that exhibit this condition.
(b) How does the process of cytokinesis differ in two cells?
(c) Define the following terms
(i) Bivalent (ii) Synapsis

OR

- (a) Enlist the 4 steps involved in catalytic action of an enzyme.
(b) Make a distinction between cofactor and coenzyme. (5)
- Q26. (a) Name the type of fertilisation that is unique to angiosperms. Describe this process.
(b) Discuss the economic importance of algae.

OR

- (a) What are triploblastic animals? Represent this condition diagrammatically. Name two non-chordate phyla that includes triploblastic animals.
(b) Differentiate between polyp and medusa. (5)

SUBJECT : CHEMISTRY (SET-I)

Time : 3 Hrs.

M.M.: 70

General Instructions :

- i) All questions are compulsory.
- ii) Question numbers 1 to 5 are very short answer type questions carrying 1 mark each.
- iii) Question numbers 6 to 10 are short answer type questions carrying 2 marks each.
- iv) Question numbers 11 to 22 are also short answer type questions carrying 3 marks each.
- v) Question number 23 is a value based question carrying 4 marks.
- vi) Question numbers 24 to 26 are long answer type questions carrying 5 marks each.
- vii) Use log tables, if necessary. Use of calculators is not allowed.

- Q1. How many significant figures are present in 3.0012?
- Q2. Why do noble gases have bigger atomic sizes than halogens?
- Q3. What will be the mass of one ^{14}N atom in grams?
- Q4. A drop of liquid assumes spherical shape. Why?
- Q5. What would be the enthalpy of any element in its standard state?
- Q6. (i) Second electron gain enthalpy for oxygen is positive. Explain.
- (ii) Arrange - N^{3-} , O^{2-} , F^- , Na^+ and Mg^{2+} in increasing order of atomic radii.
- Q7. How would you explain the fact that the first ionization enthalpy of sodium is lower than that of magnesium but its second ionization enthalpy is higher than that of magnesium.

Q8. A solution is prepared by dissolving 3.65g of HCl in 500ml of the solution. Calculate the molarity of the solution. (Given At. mass of Cl = 35.5 u)

OR

What weight of calcium contains the same number of atoms as are present in 3.2g of sulphur? (Given at. mass of Ca = 40g and S = 32g)

Q9. Derive the relationship between ΔH and ΔU for an ideal gas. Explain each term involved in the equation.

Q10. Calculate the energy of each of the photon which :

- (i) Correspond to light of frequency 3×10^{15} Hz.
- (ii) have wavelength of 0.50 \AA .

Q11. A compound contains 20.0% Mg, 26.66% S and 53.33% O. The molecular mass of the compound is 120u. Find the empirical and molecular formulas of the compound. (Given At. mass of Mg = 24, S = 32, O = 16u)

Q12.

Define the following

- (a) Critical temperature
- (b) Absolute zero
- (c) Charle's Law

Q13. Give reasons for the following :

- (i) Elements in a group show similar chemical properties.
- (ii) Alkali metals do not form dipositive ions.
- (iii) Electron gain enthalpy of chlorine is more negative than fluorine.

Q14. Calculate the wavelength and energy of photon which will be emitted when the electron of hydrogen atom jumps from fourth shell to the first shell. Ionisation energy of hydrogen atom is $2.18 \times 10^{-18} \text{ J/atom}$.

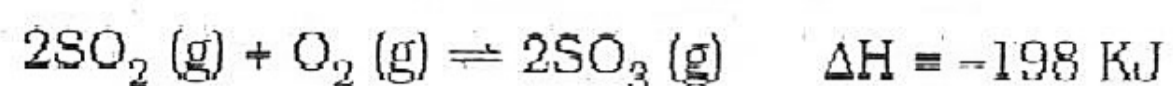
OR

- An ion with mass number 37 possesses one unit of negative charge. If the ion contains 11.1% more neutrons than the electrons, find the symbol of the ion.
- Q15. What do you mean by dipole moment? Can a non-polar molecule have polar covalent bonds? Explain with suitable example.
- Q16. A sample of nitrogen gas occupies a volume of 1.0 dm^3 at a pressure of 0.5 bar and at 40°C . Calculate the pressure of the gas if compressed to 0.225 dm^3 at -6°C .
- Q17. 1.0g of Mg is burnt in a closed vessel which contains 0.5g of O_2 , to produce MgO.
- Which is the limiting reagent?
 - What is the amount of MgO formed in the reaction?
(Given At. mass of Mg = 24, O = 16g)
- Q18. (a) Under what condition do real gases tend to show ideal gas behaviour?
- Can we apply Dalton's law of partial pressures to a mixture of carbon monoxide and oxygen?
 - Define critical temperature.
- Q19. Among the elements with atomic numbers 9, 12 and 36, identify by atomic number of an element which is -
- highly electronegative
 - an inert gas
 - highly electropositive
- Q20. Calculate the standard enthalpy of formation of C_2H_4 (g) from the following thermochemical equation :
- $$\text{C}_2\text{H}_4(\text{g}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g}) \quad \Delta_r h^\circ = -1328 \text{ KJ}$$
- Given that $\Delta_f H^\circ$ CO_2 (g) and H_2O (g) are -393.5 and -249 KJ mol^{-1} respectively.
- Q21. Write the molecular orbital configuration of O_2 , O_2^- and O_2^{2-} and arrange them in increasing order of :
- Bond order

(3)

(ii) Bond dissociation energy

Q22. For the following equilibrium reaction :



(i) Write the expression for the equilibrium constant of the reaction.

(ii) How will the equilibrium be affected if -

(a) pressure is increased

(b) temperature is decreased

Q23. Ashutosh was getting late for the office. He tried to sip boiling hot coffee from a cup. He felt very uncomfortable. His wife, Anu immediately brought a plate and asked him to sip the coffee from the plate. Ashutosh followed her advice and did not face any problem after that.

(a) Why was Ashutosh feeling uncomfortable?

(b) How did sipping coffee from a plate was more comfortable?

(c) What are the values associated with Anu's action?

Q24. (a) Light of wavelength 5000\AA falls on a metal surface of work function 1.9 eV. Find -

(i) the energy of the photons

(ii) Kinetic energy of photoelectrons

(Given $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$; $h = 6.626 \times 10^{-34} \text{ Js}$)

(b) Why do the two electrons in an orbital have opposite spin?

(c) Write the values of all the four quantum numbers for the last electron in case of K (At. no. = 19).

OR

(a) An electron has a speed of 400 ms^{-1} with uncertainty of 0.02%. What is the uncertainty in locating its position?

(b) Write the values of all the four quantum numbers for an electron present in 3d orbital.

(c) How many electrons will be present in the sub-shells having m_s value of $-\frac{1}{2}$ for $n = 4$?

Q25. (a) For the reaction : $\text{NH}_4\text{Cl (s)} \rightarrow \text{NH}_3\text{ (g)} + \text{HCl (g)}$ at 25°C , the enthalpy change, $\Delta H = +177\text{ KJ}$ and entropy change, $\Delta S = +285\text{ JK}^{-1}$. Calculate the free energy change, ΔG at 25°C and predict whether the reaction is spontaneous or not.

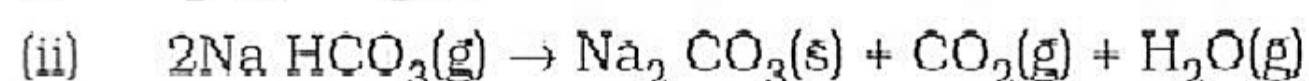
(b) What will happen to the internal energy if work is done by the system?

(c) What is the difference between an isothermal and an adiabatic process?

OR

(a) Calculate the number of KJ necessary to raise the temperature of 6g of aluminium from 35 to 55°C . Molar heat capacity of Al is $24\text{ J mol}^{-1}\text{ K}^{-1}$.

(b) Predict the sign of entropy change for the following :



(c) Define first law of thermodynamics.

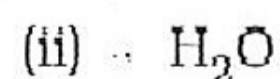
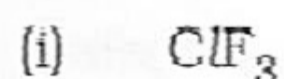
Q26. (a) What is meant by hybridisation of atomic orbitals? Explain the formation of SF_6 molecule on the basis of hybridisation.

(b) Write the resonating structures of NO_3^- .

(c) Define bond length.

OR

(a) Discuss the shapes of the following molecules on the basis of VSEPR theory :

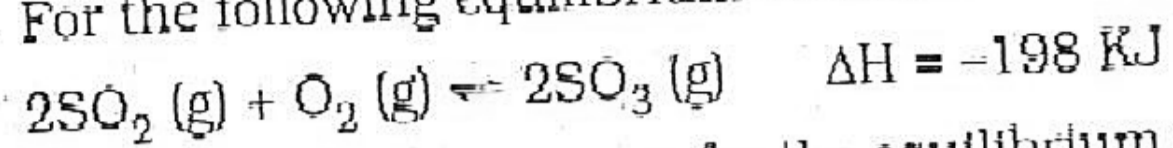


(b) Sigma bond is stronger than pi bond. Explain.

(c) Define hydrogen bond. Is it weaker or stronger than the Vander Wall forces?

(ii) Bond dissociation energy

Q22. For the following equilibrium reaction :



(i) Write the expression for the equilibrium constant of the reaction.

(ii) How will the equilibrium be affected if -

(a) pressure is increased

(b) temperature is decreased

Q23. Ashutosh was getting late for the office. He tried to sip boiling hot coffee from a cup. He felt very uncomfortable. His wife, Anu immediately brought a plate and asked him to sip the coffee from the plate. Ashutosh followed her advice and did not face any problem after that.

(a) Why was Ashutosh feeling uncomfortable?

(b) How did sipping coffee from a plate was more comfortable?

(c) What are the values associated with Anu's action?

Q24. (a) Light of wavelength 5000\AA falls on a metal surface of work function 1.9 eV . Find -

(i) the energy of the photons

(ii) Kinetic energy of photoelectrons

(Given $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$; $h = 6.626 \times 10^{-34} \text{ Js}$)

(b) Why do the two electrons in an orbital have opposite spin?

(c) Write the values of all the four quantum numbers for the last electron in case of K (At. no. = 19).

OR

(a) An electron has a speed of 400 ms^{-1} with uncertainty of 0.02% . What is the uncertainty in locating its position?

(b) Write the values of all the four quantum numbers for an electron present in $3d$ orbital.

SUBJECT : MATHEMATICS (SET-I)

Time : 3 Hrs.

M.M.: 100

General Instructions :

- (i) All questions are compulsory.
- (ii) The question paper consists of 29 questions divided into four sections A, B, C and D. Section-A comprises of 4 questions of 1 mark each, Section-B comprises of 8 questions of 2 marks each, Section-C comprises of 11 questions of 4 marks each and Section-D comprises of 6 questions of 6 marks each.
- (iii) Use of calculators is not allowed.

SECTION-A

- Q1. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{2, 4, 6, 8\}$ and $B = \{2, 3, 5, 7\}$. Find $(A \cup B)'$
- Q2. Let $A = \{1, 2, 3, 4, 5, 6\}$. Define a relation R on A by $R = \{(x, y) : y = x + 1, x, y \in A\}$. Depict this relation using an arrow diagram.
- Q3. Evaluate : $\lim_{x \rightarrow 0} \frac{\sin 3x \cdot \sin 5x}{7x^2}$
- Q4. If ${}^nC_9 = {}^nC_8$, find ${}^nC_{17}$.

SECTION-B

- Q5. Using binomial theorem, compute $(99)^4$.
- Q6. Write the following sets in set-builder form :

(i) $A = \left\{ \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \dots, \frac{9}{10} \right\}$

(ii) $B = \{1, 4, 9, 16, \dots, 64\}$

Q7. Find the derivative of $y = \frac{4x + 5\sin x}{3x + 7\cos x}$

Q8. If $\sin x = \frac{3}{5}$ and $0 < x < \frac{\pi}{2}$, find the value of $\sin 2x$ and $\cos 2x$.

Q9. Write the power set of $A = \{1, 2, 3\}$.

Q10. Find the derivative of $y = (5x^3 + 3x - 1)(x - 1)$.

Q11. Find the domain of $f(x) = \frac{x + 7}{x^2 - 8x + 4}$

Q12. Prove that : $\cos 4x = 1 - 8\cos^2 x + 8\cos^4 x$.

SECTION-C

Q13. Solve the inequations :

$$\frac{1}{2}\left(\frac{3}{5}x + 4\right) \geq \frac{1}{3}(x - 6), \quad \frac{3(x - 2)}{5} \geq \frac{5(2 - x)}{3}$$

Q14. Draw the graph of the function $f(x) = |x - 1| + 3$. Also write its domain and range.

Q15. Using binomial theorem, expand $\{(x + y)^5 + (x - y)^5\}$ and hence, find the value of $\{(\sqrt{2} + 1)^5 + (\sqrt{2} - 1)^5\}$.

Q16. Find the derivative of $f(x) = \frac{x + 1}{x - 1}$ using first principle.

Q17. Solve : $2 \tan^2 x + \sec^2 x = 2$ for $0 \leq x < 2\pi$.

Q18. If the letters word of the 'RACHIT' are arranged in all possible ways as listed in dictionary, then what is the rank of the word RACHIT?

Q19. If A, B, and C are three sets, then prove that :

$$A - (B \cap C) = (A - B) \cup (A - C)$$

Q20. Find the value of a so that the term independent of

$$n \text{ in } \left(\sqrt{x} + \frac{a}{x^2} \right)^{10} \text{ is } 405.$$

Q21. Evaluate : $\lim_{x \rightarrow 2} \frac{x^2 - 4}{\sqrt{3x - 2} - \sqrt{x + 2}}$

Q22. A bag contains 6 white marbles and 5 red marbles. Find the number of ways in which four marbles can be drawn from the bag if

- (i) they can be of any colour
- (ii) two must be white and two must be red
- (iii) they must be of the same colour.

Q23. Prove that $\tan 4x = \frac{4 \tan x (1 - \tan^2 x)}{1 - 6 \tan^2 x + \tan^4 x}$.

SECTION-D

Q24. (i) Evaluate : $\lim_{x \rightarrow 0} \frac{\sqrt{2} - \sqrt{1 + \cos x}}{\sin^2 x}$

(ii) Find $\lim_{x \rightarrow 1} f(x)$, where $f(x) = \begin{cases} x^2 - 1 & , x \leq 1 \\ -x^2 - 1 & , x > 1 \end{cases}$

Q25. (i) Prove that :

$$\sin x + \sin 3x + \sin 5x + \sin 7x = 4 \cos x \cos 2x \sin 4x$$

(ii) Convert the following radian measure into degree

$$\text{measure : } \frac{11}{16}$$

Q26. Out of 6 boys and 4 girls, a committee of 5 is to be formed. In how many ways can this be done if

(a) at least 2 girls are included?

(b) at most 2 girls are included?

Q27. Using the principle of mathematical induction, prove that:

$$1.3 + 2.3^2 + 3.3^3 + \dots + n.3^n = \frac{(2n-1)3^{n+1} + 3}{4} \text{ for all}$$

$n \in \mathbb{N}$.

Q28. Solve the following system of linear inequalities graphically:

$$x + 2y \leq 8, \quad 2x + y \geq 2, \quad x - y \geq 2, \quad x \geq 0, \quad y \geq 0$$

Q29. (i) A wheel of a motor is rotating at 1200 revolutions per minute. If the radius of the wheel is 35 cm, what linear distance does a point of its rim transverse in 30 sec.? What steps should be taken to discourage reckless driving?

(ii) Let R be the relation on the set I of integers defined by $R = \{(x, y) : y = 2x + 7, x, y \in I, -5 \leq y \leq 10\}$?

(a) Find R.

(b) Depict R using arrow diagram.

FT-F

9/2016

SUBJECT : PHYSICS (SET-II)

Time : 3 Hrs.

M.M.: 70

General Instructions :

- (i) All questions are compulsory.
- (ii) Question numbers 1 to 5 are very short answer questions carrying 1 mark each.
- (iii) Question numbers 6 to 10 are short answer questions carrying 2 marks each.
- (iv) Question numbers 11 to 22 are also short answer questions carrying 3 marks each.
- (v) Question number 23 is a value based question carrying 4 marks.
- (vi) Question numbers 24 to 26 are long answer questions carrying 5 marks each.
- (vii) There is no overall choice but an internal choice is given in 1 question of 2 marks, 1 question of 3 marks and all questions of 5 marks.
- (viii) You may use the following constants :

$$G = 6.6 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2} \quad M_e = 6.4 \times 10^{24} \text{ Kg}$$

$$R_e = 6.4 \times 10^6 \text{ m}$$

SECTION-A

- Q1. A mass is dropped from certain height. At the same time, another identical mass is thrown with a horizontal velocity (u) from the same height. Which one of the two will reach the ground first? Give reason.
- Q2. Ten one rupee coins are put on top of each other. Each coin has a mass m. Give the magnitude and direction of the force on the 7th coin (counted from bottom) by the eighth coin.
- Q3. If $\vec{P} + \vec{Q} = \vec{R}$ and $|\vec{P}| = 5$, $|\vec{Q}| = 12$ and $|\vec{R}| = 13$. Find the angle between $|\vec{P}|$ and $|\vec{Q}|$.

(1)

Q4. The equation of state for a real gas is given by:

$$\left(P + \frac{a}{V^2}\right)(V - b) = RT$$

Find the dimensions of a.

Q5. Does the work done depend on how fast or slow a body is moved? Give reason for your answer.

SECTION-B

Q6. A river 800m wide flows at 5 km/h. A swimmer who can swim at 10 km/h in still water wishes to cross the river so that he reaches the other bank directly opposite to the point from where he started.

- (i) Along what direction should he start?
- (ii) What is his resultant velocity?

Q7. The time period of a satellite around a planet is T in an orbit of radius r. If the gravitational force between the planet and satellite varies as $F \propto r^{-5/2}$, then find the relation between T and r.

Q8. An object is moving along x-axis with a uniform acceleration of 4 m/s^2 . At $t = 0$, $x = 5\text{m}$ and $v = 3 \text{ m/s}$. What will be the position of the object when it has a velocity of 5 m/s ?

- Q9. (i) A stone tied to the end of a string is whirled in a circle. If the string breaks, the stone flies away tangentially. Why?
- (ii) If both the speed and radius of the circular path of a body are doubled, how will the centripetal acceleration change?

Q10. The measure of the radius of a cylinder is $1.60 \pm 0.01 \text{ cm}$ and its length is $5.0 \pm 0.1 \text{ cm}$. Calculate the percentage error in its volume.

OR

The velocity of a freely falling body is a function of the distance fallen through (h), acceleration due to gravity (g)

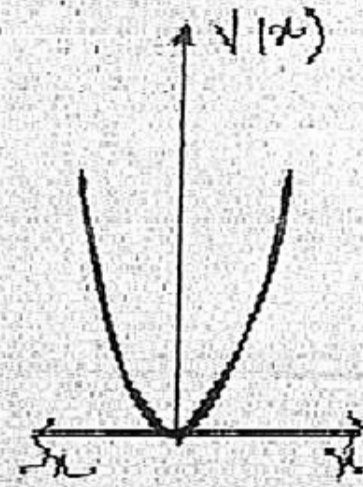
and the mass of the object (m). Find an expression for the velocity by the method of dimensions.

SECTION-C

Q11. The potential energy function for a particle undergoing oscillatory motion is given by

$$V = \frac{Kx^2}{2}, \text{ where } K \text{ is the force constant}$$

of the oscillator. For $K = 0.5 \text{ N/m}$, a graph of V with x is as shown. Show that a particle of total energy 1J , moving under this potential must turn back at $x = \pm 2\text{m}$.



Q12. Show various forces on a vehicle negotiating a rough inclined circular turn. Hence find the maximum safe velocity of the vehicle with which it can negotiate the circular turn.

Q13. On a long horizontally moving belt, a child runs to and fro with a speed of 9 km/h wrt the belt between two points A and B, 50m apart. The belt moves with a speed of 4 km/h . For an observer, on a stationary platform outside, what is the -

- (i) speed of child when running in the direction of motion of the belt?
- (ii) speed of the child when running opposite to the direction of motion of the belt?
- (iii) time taken by the child in (i) and (ii)?

Q14. Show that the gravitational PE of a body at a point distant

r from the centre of earth is $\frac{-GMm}{r}$. What does the negative sign signify?

Q15. (i) Describe the parallax method for determining the diameter of a star from earth.

(ii) Rule out or accept the following formulae of KE on the basis of dimensions :

$$(a) \quad KE = \frac{3}{16} mu^2$$

$$(b) \quad KE = \frac{1}{2} mu^2 + ma$$

Where, m is the mass of the object, u is its speed and a is the acceleration.

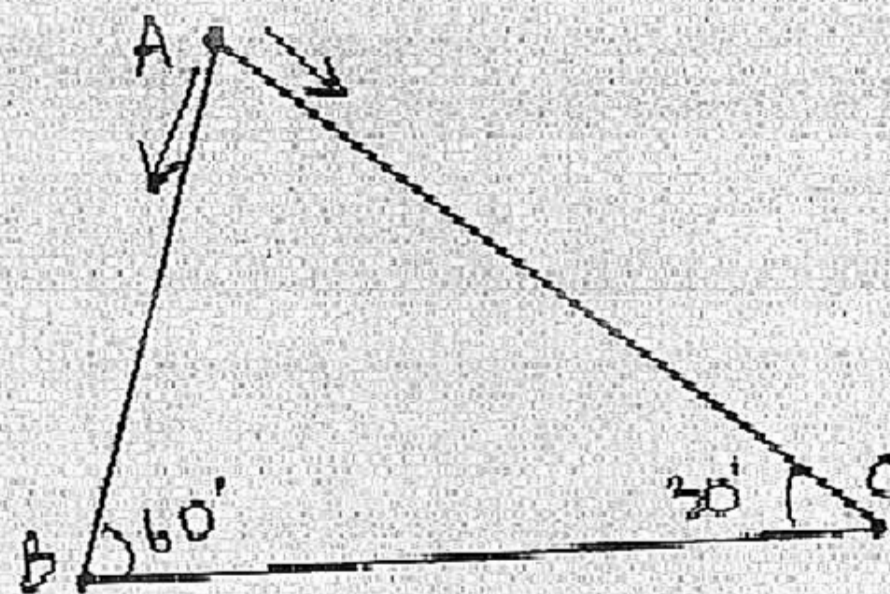
- Q16. (i) Find the angle between $\vec{A} \times \vec{B}$ and $\vec{A} + \vec{B}$ if \vec{A} and \vec{B} lie in a plane?
- (ii) The horizontal component of the velocity of an object is 40 km/h. If the total velocity is 80 km/h, then find the vertical component of the velocity.

OR

Find a unit vector perpendicular to the vectors \vec{A} and \vec{B}

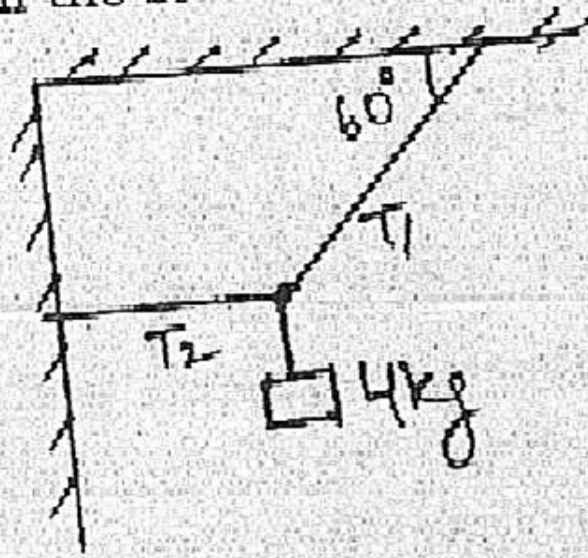
where $\vec{A} = 2\hat{i} - \hat{j} - \hat{k}$ and $\vec{B} = \hat{i} + \hat{j} + \hat{k}$.

- Q17. Two inclined frictionless tracks, one gradual and the other steep meet at point A from where two identical stones are allowed to slide down from rest as shown :



- (i) Will the stones reach the foot of incline with same speed?
- (ii) Will the stones reach the foot of incline at same time?
- Explain, giving reasons for both parts.

- Q18. (a) Determine the tensions T_1 and T_2 in the strings shown, if the block is in equilibrium.



- (b) A horizontal force of 2N is applied on a block of 500g, lying on a surface. The coefficient of static friction between the block and surface is 0.5. What will be the acceleration of the block?
- Q19. (i) Write the number of significant figures in 2.00 kg, 0.5 m
- (ii) Which of the following is more precise device for length measurement :
- (a) a vernier calliper with 20 divisions on the sliding scale.
- (b) a screw gauge with a pitch 1mm and 100 divisions on the circular scale. Explain.
- Q20. (a) Why is kinetic friction smaller than static friction?
- (b) A box of mass 4 kg is placed on a wooden surface of length 1.5m which is lying on the ground. The wooden surface is lifted from one end so that it becomes inclined. When the vertical height of the wooden surface becomes 0.75m, the box begins to slide. Find the coefficient of friction between the box and wooden surface.
- Q21. Justify the statement that a uniform circular motion is an accelerated motion. Establish a relation between -
- (i) linear velocity and angular velocity in a uniform circular motion.
- (ii) Linear velocity and the centripetal force in a uniform circular motion.

- Q22. (a) Prove that the maximum horizontal range is four times the maximum height of a projectile when fired at an inclination so as to have maximum range.
- (b) What is the angle between velocity and acceleration of a projectile at its highest point?

SECTION-D

Q23. Ravi went to the market with his grandfather & purchased a weighing machine. They came back to their society and entered the lift. Ravi placed the machine on the floor of the lift and asked his grandfather to stand on it. The reading on the machine was 50kg. When the lift started moving upwards, the reading increased to 75kg and when the lift stopped at the 10th floor, the reading again dropped to 50kg. Seeing this, his grandfather was confused and insisted that the machine is faulty. Ravi told his grandfather that the machine is not faulty. He explained the reason behind the different readings shown by the machine.

- (i) What values are exhibited by Ravi?
- (ii) What explanation did Ravi give to his grandfather? Explain with the help of a diagram.
- (iii) Find the acceleration of the lift.

SECTION-E

- Q24. (a) State Kepler's 3rd law of planetary motion.
- (b) Two planets of same mass have radii in the ratio 3:2. Find the ratio of escape velocity from their surface.
- (c) A rocket is launched from the surface of earth with a speed of 4 km/s. Find the maximum height upto which it will reach.

OR

- (a) Obtain a mathematical expression to show the variation in acceleration due to gravity with the height (h) above the surface of earth; where $h \ll R_e$.
- (b) Plot the result graphically.

- (c) The density of two planets whose masses are in the ratio 8:1 is same. Find the ratio of acceleration due to gravity of the two planets.

Q25. A body tied to one end of a string is made to revolve in a vertical circle. Derive the expression for the velocity of the body and tension in the string at any point. Hence find the speed of the body at the topmost and the lowest point of the circle.

OR

- (a) Obtain an expression for the coefficient of restitution for an elastic collision of two masses m_1 and m_2 moving in same direction with speed u_1 and u_2 respectively.

- (b) A molecule in a gas container hits a horizontal wall with speed 200 m/s at an angle of 30° with the normal. It rebounds with the same speed and at angle of 30° with the normal. Is the momentum conserved in the collision? Is the collision elastic or inelastic? Give reasons for your answers.

Q26. (a) Draw the following graphs representing motion of an object under free fall :

- (i) variation of velocity with time.
(ii) variation of acceleration with time.

- (b) A body is dropped from rest from a height of 150m. Simultaneously, another body is dropped from rest from a height of 100m. What is the difference in their heights after they have fallen for 2s? How will this height vary with time?

OR

- (a) Derive the 3rd equation of motion using calculus.
(b) A police van moving on a highway with a speed of 30 km/h fires a bullet at a thief's car speeding away in the same direction with the speed of 192 km/h. If the muzzle speed of the bullet is 150 m/s, with what speed does the bullet hit the thief's car?

SUBJECT : ENGLISH (SET-I)

Time : 3 Hrs.

M.M.: 80

General Instructions :

- (i) All questions are compulsory.
- (ii) You may attempt any section at a time.
- (iii) All questions of that particular section must be attempted in the correct order.
- (iv) Avoid cutting and over-writing.

SECTION-A (READING)

- Q1. Read the given passage carefully : (12)
1. How often have you heard people remark : "I'm not like the rest; I'm different"? How often do people make this assessment of themselves in varied contexts? To some extent it is true; all of us are unique, different from each other. It is heartening to know that no two snowflakes are alike and everyone's finger prints are unique. Indeed, very few things in nature are exactly alike; each cloud, each flower, tree, every leaf, and even water molecules, are different from each other. Certainly, Nature never meant human beings to be clones of each other. Our DNA, circumstances of birth, culture, upbringing, influences and exposure - all ensure each individual has striking differences from another.
 2. But we ignore that reality and pour ourselves into readily available cast. We model ourselves on available leads, become a part of groups and thereby lose our individual identities. Looking around for affirmations and approvals, we end up as clones of each other. Drowning the voice of our individual drummer we march to tunes that have the stamp of social approval.
 3. And yet the niggling voice within us sometimes asserts itself, and we declare we are different. Of course we are. Each one of us is different. But do we really appreciate or even understand our own differentiators? Do we work upon and display these to our advantage? "If you only read the books that everyone is reading you can only think what everyone else is thinking", says Haruki Murakami in Norwegian Woods. True. And similarly if you only do what everyone else is doing, wear what others are wearing, echo opinions and reflect attitudes you encounter elsewhere - you can only be one of many!
 4. If you wish to lead a life less ordinary it is important to create your differentiator and nurture it. Just like a differentiator helps grow or kill a business, differentiator for an individual gives him that competitive edge over others. This is what will make you stand out, be the one who is selected from amongst many, and the cynosure of all eyes in a crowded room. Your differentiator is what gives you your individual identity, the one thing that will make you stand out in a sea of 'others'.
 5. To identify your differentiators focus on understanding and accepting yourself as you are, without wanting to be someone or something else. This will help you naturally gravitate towards things that enhance and add value to you. You will learn to develop skills and use these to your best advantage without looking around for guidance or waiting for a sign. You will develop your own individual personalities as well as style statements.

6. It is important to develop your signature style, be it in personality traits, attitude or style statement. It could be the pursuit of a hobby that lifts you above the rest, or a philosophy or outlook you display. Step out of the boxes you have been taught to grow within and explore possibilities beyond. Consciously attempt to do things in your own way. Certain traits become the hallmark of a profession. Bureaucrats will be pompous; politicians will be smoothly devious; journalists will be intrusive; clerks irritable, scientists will be absent-minded; lawyers argumentative and doctors harried! Some are smart enough to consciously step away from adopting the traits associated with a group or profession; they develop their own differentiators and attitudes. These are the ones instantly marked as 'different'.
7. But different from what? It is very easy if difference alone is the agenda. Wear strange clothes, walk in a strange manner, be rude amongst polite people and take on an anti-special stance. You are different! However being subversive or an object of ridicule is not the point. Nor is it the idea to stand out for the heck of it. Your differentiator has to be real and true to you as you understand yourself. Then alone it is enticing and exciting.
8. Hence in order to be effective, the differentiator has to define you and your agenda, not be the agenda itself. That will make you stand apart. That will give you the cutting edge over others and distinguish you from the rest of the crowd.

1.1 On the basis of your understanding of the above passage, answer the following questions by choosing the most appropriate option : (1x4=4)

- (a) Human beings are different from each other because _____
 - (i) nature never meant us to be clones
 - (ii) we are made like snowflakes
 - (iii) we follow different professions
 - (iv) our DNA is wired at birth
- (b) Despite being different from one another _____
 - (i) we fight for our rights
 - (ii) we become individual drummers
 - (iii) we go to nature for support
 - (iv) we pour ourselves into a readily available cast
- (c) If you do what others are doing, _____
 - (i) you lead an extraordinary life
 - (ii) you become part of the crowd
 - (iii) you become cynosure of all eyes
 - (iv) you create your individual identity
- (d) Your true differentiator is _____
 - (i) wearing clothes that others are wearing
 - (ii) take an anti-special stance
 - (iii) be true and understand yourself
 - (iv) be enticing and attractive

1.2 Answer the following questions briefly :

(1x6=6)

- (a) What gives individuals their striking differences?
- (b) What steps do we take to drown our differences?
- (c) What are the advantages of accepting ourselves as we are?
- (d) What are differentiators? How can one avoid them?
- (e) How can one be an effective personality?
- (f) What is the ultimate test of a true differentiator?

1.3 Find words from the passage that mean the same as :

(1x2=2)

- (a) to foster (para 4)
- (b) prying into another's affairs (para 6)

Q2. Read the passage given below and answer the questions that follow :

(8)

1. Most parents at some stage are driven to distraction by one or more of their children's annoying habits or behaviours, whether it is a toddler who continually whines, a school-aged child who leaves clothes lying around or a teenager who uses a less than pleasant vocabulary.
2. How to affect change is a challenge for many parents. Do you ignore a child's annoying behaviour or do you pick up on it? A useful rule of thumb is to pick up on behaviours that are dangerous to the child himself or significantly infringe on the rights and comfort of others. Also ask yourself: Is this behaviour reasonable for the child's age? For instance, it is reasonable to expect an eight-year-old not to disturb you while you are on the phone for twenty minutes but it is not reasonable to expect the same of a two-year-old. It is also useful to take into account the child's current state of mind and what is going on in their lives that may be related to some unusual behaviour to occur at home.
3. The following four principles for changing your child's behaviour will be effective if you are both patient and persistent. Change your initial response first. This is important because children's behaviour generally requires a pay-off, which may be your attention or an attempt to defeat you. The most important principle about changing children's behaviour is to change your own behaviour first. So, if your child whines to get his own way refrain from answering back or giving in.
4. Practice with your child the behaviour that you want. The notion of behaviour rehearsal is fundamental to learning a new behaviour. Don't just tell kids what you expect, get them to practice the behaviour you want. In the example of a young whiner - get him to practice asking for help or a treat in a normal voice.
5. Minimise the behaviour you don't want. That means when children continue their old behaviour despite your brilliant suggestions ignore it, sidestep it or implement a consequence but don't nag or harp on it. Remember it takes time often to change a behaviour, particularly if it has been happening for a long time. Spotlight the appropriate behaviour. When your children behave in the desired way show your sincere appreciation. We often take children for granted or rather we are trained to give children no attention when they are good, but plenty when they are less than perfect. The behaviours we focus on expand so we need to focus our attention on desirable

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behaviours more than on the negative behaviours. For our young whiner it is essential to make a fuss when he uses a normal voice to get what he wants.

6. Like any process it will only work if you stick to it and follow it through. And don't be afraid to adapt it to suit your circumstances. Remember, it is the fact that you have a plan rather than the nature of the plan that is most powerful in achieving a change in your children's behaviour.

- *The Times of India*

- (A) On the basis of your reading of the above passage, make notes on it, using headings and sub-headings. Use recognizable abbreviations (wherever necessary - minimum four). Also supply an appropriate title. (5)
- (B) Write a summary of the above passage in about 80 words using the notes made. (3)

SECTION-B (ADVANCED WRITING SKILLS)

- Q3. As the Sports Captain of Laurel High School, Karnal, write a notice for student's notice board informing budding cricketers to attend trials for selection to the school team.

OR

The Power Grid Corporation of India needs a poster for its nationwide 'Save Energy Campaign'. Draw a poster for the campaign. (4)

- Q4. You are Anita/Gautam staying at Ankur Apartments, Mayur Vihar, Delhi. There is no park within the radius of 2 km from the society. The absence of a park is causing a lot of inconvenience to the residents, especially children and elderly people. Write a letter to the editor 'The Times of India' drawing attention of the concerned authorities to the problem.

OR

Everyday newspapers scream of a new scam, a new scandal, a new case of corruption or embezzlement or unearthing of unaccounted money, arrest of officials taking bribe and what not. Write a letter to the editor of a national daily voicing your concern over the issue. (6)

- Q5. A special Theatre Festival is being held in your school. Many well known modern plays will be staged by amateur theatre groups in this week-long festival. Write a report in about 150-200 words on the proceedings of the festival.

OR

Today reckless driving on roads is a great threat. The roads have virtually become death traps for pedestrians and motorists alike thanks to speeding vehicles. Write an article in about 150-200 words on the topic 'Reckless Driving Thrills But Kills'. (10)

SECTION-C (TEXT BOOKS AND LONG READING TEXT)

- Q6. Read the following extracts and answer the questions that follow : (4)

The cardboard shows me how it was
When the two girl cousins went paddling,
Each one holding one of my mother's hands,
And she the big girl - some twelve years or so.

(a) What does 'it' refer to in this extract? (1)

(b) Who is 'she' here? Why has she been called 'big'? (1)

- (c) What has happened to her now? (1)
(d) What did the photograph depict? (1)

OR

And who art thou? Said I to the soft falling shower,
Which, strange to tell, gave me an answer, as here translated :
I am the Poem of Earth, said the voice of the rain.

- (a) Who are the two people in conversation? (1)
(b) What did the poet ask? (1)
(c) Why was it 'strange to tell'? (1)
(d) What does the rain call itself? Why? (1)

- Q7. Answer any four of the following questions in 30-40 words each : (4x3=12)
- (a) Which lifetime habit did the grandmother break on the day of the author's arrival from abroad? How did she make amends for it?
(b) How did the crew of the 'Wave walker' prepare themselves for the worst?
(c) The poem 'A Photograph' highlights contradictory feelings of permanence and transience. Comment.
(d) How did the dogs at John Byro's vineyard behave? What explanation did Mourad give for this behaviour?
(e) Who was Mrs. Dorling? What made her renew her contact with Mrs. S, the narrator's mother?
(f) The old lady who had come to see Ranga on his return from Bangalore went away satisfied. Why?

- Q8. Answer the following question in 120-150 words : (6)
Describe the narrator's ploy to get Ranga married.

OR

The grandmother was a caring lady. She loved animals and birds and took care of the street dogs and the sparrows. Based on your reading of the story, write a character sketch of the author's grandmother.

- Q9. Answer the following question in 120-150 words : (6)
The children faced the situation more bravely and maturely than their years. Discuss.

OR

How does Aram describe the 'spirit of his tribe'? What was the hallmark of his tribe?

- Q10. Answer the following question in 120-150 words : (6)
Discuss the elaborate preparations made by the ghost for his August 17 performance. Did it achieve the desired effect?

- Q11. Answer the following question in 120-150 words : (6)
Write the character sketch of Mr. Otis.

Term-I
Class - XI
SUBJECT: PHYSICAL EDUCATION

TIME: 3 HOURS

M.M-70

General Instructions:

- (i) *All questions are compulsory.*
- (ii) *Answer to question carrying 1 mark should be approximately 30 words.*
- (iii) *Answer to question carrying 3 marks should be approximately in 100 words.*
- (iv) *Answer to question carrying 5 marks should be approximately in 150-200 words.*

- Q1. What is the aim of Physical Education? (1)
- Q2. Write down the oath of Special Olympic Bharat? (1)
- Q3. What is meant by life style? (1)
- Q4. What do you mean by coordinative abilities? (1)
- Q5. Write down the Olympic Oath? (1)
- Q6. What do you mean by Body Composition? (1)
- Q7. What is Pranayama? (1)
- Q8. What is Olympic Motto? (1)
- Q9. What are types of Doping? (1)
- Q10. Define Blood Doping? (1)
- Q11. Define Physical Activity? (1)
- Q12. Write a short a note on Olympic Flag? (3)
- Q13. Discuss the role of maintaining a healthy weight in preventing health threats through the lifestyle changes? (3)
- Q14. Briefly discuss about Paralympic Movement. (3)
- Q15. Briefly explain the principles of Integrated Physical Education. (3)
- Q16. Describe any three physiological benefits of Asnas? (3)
- Q17. Discuss about the opening and closing ceremony of Modern Olympic Games. (3)
- Q18. Define Strength and discuss its types in brief. (3)
- Q19. What do you mean by Asnas? Discuss the types of Asnas? (3)

- Q20. Discuss the elements of Yoga? (5)
- Q21. Explain about Rajiv Gandhi Khel Ratna Award. (5)
- Q22. Discuss the main Aims of National Institute of Sports. (5)
- Q23. Discuss the methods of prevention and management of Diabetes. (5)
- Q24. Describe the side effects of Anabolic steroids, stimulants, narcotics, Beta-2-Agonists and Diuretics. (5)
- Q25. Discuss any five essential elements of Positive Sports Environment. (5)
- Q26. Describe any five types of Ergogenic Aids. (5)

SUBJECT : COMPUTER SCIENCE (SET-I)

Time : 3 Hrs.

M.M.: 70

General Instructions :

(i) All the questions are compulsory.

(ii) Programming language: C++

- Q1. (a) Distinguish between input devices and output devices. (2)
- (b) What are language processors? Give the names of all language processors. (2)
- (c) Write any two weaknesses of a computer? (1)
- (d) Write a short note on operating system. (1)
- (e) (i) Convert following number from octal to decimal
7356 (1)
- (ii) Convert hexadecimal to binary. (1)
7AB4.4F
- (iii) Convert binary to octal (1)
11100011110.10111
- (f) What is taskbar? (1)
- Q2. (a) (i) Explain the following Operating Systems? (2)
- (a) Time sharing OS
- (b) Multi processing OS
- (ii) What is the use of folders? (1)
- (b) Explain any two types of integer constants. (2)
- (c) (i) Out of the following, find those identifiers, which can be used for naming variable, constants or functions in a C++ program. (2)
- _Cost, price*qty, float, Switch, All data, Delete, Number12, do

(1)

- (ii) What will be result of $a = 3/5$ if a is (c1) int
(c2) float? (1)
- (d) Write a program to Calculate Area fo Equilateral Triangle. (2)
- Q3. (a) Arrange the data types from largest to smallest based upon the size. (2)
long, double, char, int
- (b) Write a C++ program to input any average marks and to find grade value based upon the following information. (3)

Average Marks	Grade
≥ 85	A
$< 85 \ \& \ \geq 65$	B
$< 65 \ \& \ \geq 45$	C
$< 45 \ \& \ \geq 25$	D
< 25	E

- (c) (i) Explain any two user define data type with an example. (2)
- (ii) Define a structure data type with an example? (2)
- (d) What will be the size of the following constants? (1)
- (i) "LOGICAL EXPRESSION"
- (ii) 'Y'
- Q4. (a) What is the difference between automatic type conversion and type casting? Give example to explain both. (2)
- (b) What will be the output of the following code : (2)
- (i) `cout<<"$\n&&\n$$$t&&&\n";`
- (ii) `char b = '%'; cout<<b; cout<<"b";`
- (c) Write a program to input any number and to find factorial value of that number. (3)

- (d) Write a program to print the area of square, circle and triangle using switch statements only (3)
- Q5. (a) (i) Explain logical errors and run time errors with an example. (2)
- (ii) Differentiate between while and do...while. (2)
- (b) (i) Rewrite the corrected program : (2)

```
#include<iostream.h>
void main( )
{
int j = 99, a;
float u = 10.0;
cin(a);
while a<=j
{
a+=10;
u=*a;
}
}
```

- (ii) Write an equivalent do...while loop for the following for loop. (2)

```
for (i=20, s=0; i<=500; i+=20)
{
cout<<i<<"\t";
s+=i;
}
cout<<"\n sum="<<s;
```

- (c) Find Two's complement of (-76) [use one byte memory] (2)
- Q6. (a) What is the difference between '7', 7, 7.7 and "7"? (2)
- (b) Write a program to check whether given year is leap year or not. (2)

- (c) Rewrite the following code fragment using if. (2)

```
switch(ch)
{
case 'P' : cout<<"Platinum";
break;
case 'G' : cout<<"Gold";
break;
case 'S' : cout<<"Silver";
break;
default : cout<<"Normal";
}
```

- (d) (i) int i=0, sum=0;
while(++i<5)
sum+=i;
cout<<"Sum="<<sum;

(ii) int i=0, sum=0;
while(i++<5)
sum+=i;
cout<<"Sum="<<sum;

- (a) Find the output of the above codes. (2)
(b) How many times the above loops will execute. Explain. (2)

- Q7. (a) Write a program to input any number and to print all Prime numbers upto given number. (4)
(b) Write a program to find the sum of all odd natural numbers upto given number. (2)
(c) Write a program to check whether the reverse of the number is same as given number or not. (4)