

CLASS : XI

SUBJECT : PHYSICS (SET-I)

Time : 3 Hrs.

M.M.: 70

**General Instructions :**

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

$$G = 6.6 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$$

**SECTION-A**

- Q1. Two equal forces have their resultant equal to either. Find the angle between them.
- Q2. What is the distance between two points in a wave having a phase difference of  $2\pi$ ?
- Q3. Draw a graph between P and  $\frac{1}{V}$  for an ideal gas at constant temperature.

(1)

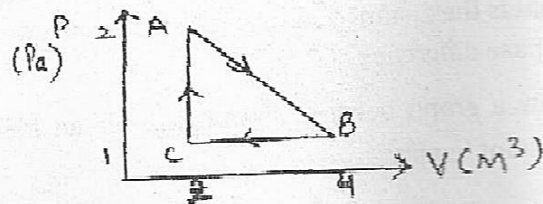
- Q4. The material with which two planets are made is same. What is the dependence of  $g$  on the radius of the planets?
- Q5. If the acceleration of a particle is constant in magnitude but its direction changes continuously, then what type of path does the body follow?

**SECTION-B**

- Q6. If  $P$  is power,  $t$  is time and  $x$  is distance, then find the dimensions of  $a$  and  $b$  from the relation :  $P = \frac{b - x^2}{at}$
- Q7. A car travels a length  $l$  with speed  $v_1$  and returns back to the same point with speed  $v_2$ . Find (a) average speed (b) average velocity.
- Q8. A body of mass  $0.5\text{kg}$  travels in a straight line with velocity  $v = ax^{3/2}$  where  $a$  is a constant. What is the work done on the object during its displacement from  $x = 0$  to  $x = 2\text{m}$ ?
- Q9. The amplitude of an oscillating simple pendulum is doubled. What will be the effect on the (i) time period (ii) total energy? Give reason for your answers.
- Q10. A heat engine operates between  $500\text{K}$  and  $400\text{K}$ . If it absorbs  $6 \times 10^5$  cal heat at higher temperature, then find the work done by the engine in one cycle.

OR

P-V diagram for a cyclic process is ABC as shown. Calculate the work done during the process from (a) A to B (b) C to A.



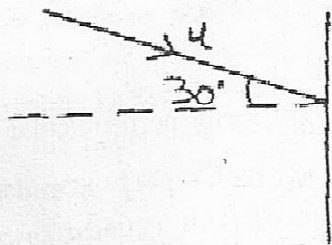
(2)

### SECTION-C

Q11. Write the S.I. units of torque.

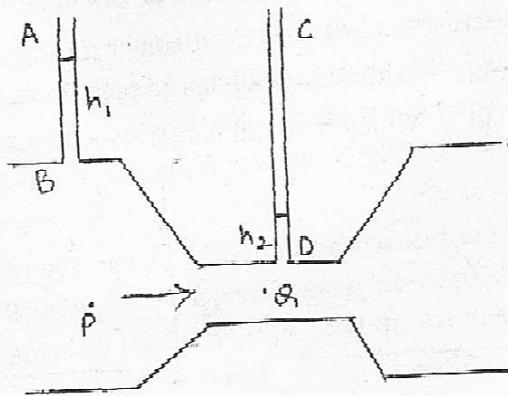
A 10m long ladder of mass 5kg stands against a frictionless wall. The foot of the ladder is 6m away from the wall. Find the force of friction between floor and the ladder and the normal reaction from the wall and the floor.

Q12. (a) A ball of mass 150g is thrown towards a wall with a speed of 18 m/s as shown. It reflects back from the wall with same speed. Find the force exerted by the wall on the ball if the ball remains in contact with the wall for 0.015 seconds.



(b) State the law of conservation of linear momentum.

Q13. (a) As shown in the figure, water flows from P to Q. Explain, why height  $h_1$  of column AB of water is greater than height  $h_2$  of column CD of water.



(3)

- (b) Water on a clean glass surface tend to spread while mercury on the same surface tends to form drops. Why?

Q14. Obtain an expression for the escape speed from the surface of a planet of mass  $M$  and radius  $R$ . The radius of earth is reduced by 4%, its mass remaining same. What will be the percentage change in the escape velocity?

Q15. (a) A projectile is projected with velocity  $u$  at an angle  $\theta$  with the horizontal direction. Find its time of flight and horizontal range.

(b) Show that range of projection of a projectile for two angles of projection  $\alpha$  and  $\beta$  is same if  $\alpha + \beta = 90^\circ$ .

OR

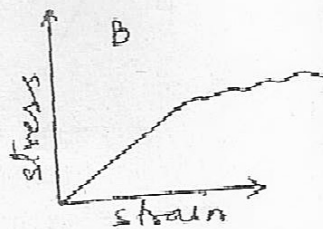
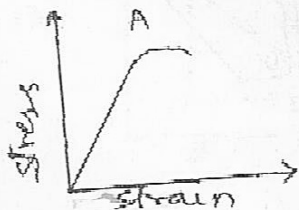
(a) Find a unit vector perpendicular to the vectors  $\vec{A}$  and  $\vec{B}$ , where  $\vec{A} = \hat{i} + \hat{j} - \hat{k}$  and  $\vec{B} = 2\hat{i} - \hat{j} + 3\hat{k}$ .

(b) Is  $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$ ? Justify your answer.

Q16. (a) The Young's modulus of a wire of length  $L$  and radius  $r$  is  $Y$ . If the length is reduced to  $L/2$  and radius  $r/2$ , what will be its Young's modulus?

(b) The stress-strain graphs for two materials A and B are as shown :

- (i) Which material has greater Young's modulus?
- (ii) Which material is more ductile?



(4)

- Q17. (a) The earth without its atmosphere would be inhospitably cold. Why?
- (b) 2kg water at  $80^{\circ}\text{C}$  is mixed with 3kg water at  $20^{\circ}\text{C}$ . Assuming no heat loss to the surroundings, find the final temperature of the mixture.
- Q18. If  $A = 12.0 \pm 0.1$  cm and  $B = 8.0 \pm 0.5$  cm. Find percentage error in (a)  $A + B$  (b)  $A \times B$ .
- Q19. (a) An inclined plane has its top most point at a height  $h$ . Prove that the work done to bring a mass to the ground level either vertically or along the smooth inclined surface is equal and its value is  $mgh$ .
- (b) A block of mass  $M$  moving at speed  $u$  collides with another block of mass  $2m$  at rest. After collision, the lighter block turns back with half its initial speed and the heavier block remains at rest. Find the coefficient of restitution.
- Q20. (a) Check whether the following functions represent SHM :
- (i)  $x = a \cos \omega t + b \sin \omega t$
- (ii)  $x = a \cos \omega t + a \cos 2\omega t$
- (b) Find the time taken by a particle to move from  $-A/2$  to  $A/2$  in a SHM represented by  $x = A \sin \omega t$ .
- Q21. Define an adiabatic process. Derive an expression for work done during an adiabatic process. An ideal gas at  $200\text{K}$  expands adiabatically so as to increase its volume to 8 times the initial volume. Find its final temperature; if  $\gamma = 3/2$ .
- Q22. A body moving with uniform acceleration has a velocity of  $25$  m/s after a time of  $5$  s from the start; and its velocity  $8$  s after the start is  $34$  m/s. Find the distance covered by the body in  $10^{\text{th}}$  second.

### SECTION-D

Q23. Raju had seen his mother grinding flour in the grindstone since his childhood. He felt very helpless as his mother had to put in a lot of effort. As he grew older, he thought of an idea and connected a small electric motor to the wheels of the grindstone. Now it became easier to get flour and Raju's mother was very happy and felt proud of her son.

- (i) What does this show about Raju?
- (ii) A grinding stone of radius 2m revolving at 120 rpm accelerates to 660 rpm in 9 seconds. Find the angular acceleration and linear acceleration.

### SECTION-E

- Q24. (a) Discuss the formation of stationary waves in stretched strings. Show that in a stretched string, the first four harmonics are in the ratio 1:2:3:4.
- (b) A tuning fork produces 4 beats/sec with a wire oscillating at a frequency of 73 Hz. If the length of the wire is shortened then 5 beats are heard in a second. Find the frequency of the tuning fork.

OR

- (a) Explain Doppler effect in sound.
  - (b) Find the velocity of source, when the frequency appears to be double the original frequency to a stationary listener.
  - (c) Write the factors on which speed of sound waves depends.
- Q25. Define terminal velocity. Why does a sphere attain this velocity? Derive an expression for the terminal velocity. Plot  $v-t$  and  $a-t$  graphs for a small spherical body falling in a viscous liquid.

OR

- (a) Show that for curved liquid surface in equilibrium, the concave side has more pressure than convex side.
- (b) Explain capillary action using excess pressure.
- (c) Water rises upto a height of 10cm in a certain capillary tube. The level of mercury falls by 3.5cm in the same capillary tube. Find the ratio of surface tension of water and mercury. Given  $\rho_{\text{H}_2\text{O}} = 1 \text{ g/cm}^3$ ,  $\rho_{\text{Hg}} = 13.6 \text{ g/cm}^3$  angle of contact for water =  $0^\circ$  and for mercury =  $135^\circ$ .

Q26. Why are curved roads banked? Obtain an expression for the speed with which a vehicle of mass M can take a turn on a rough banked road.

OR

Distinguish between static, limiting and kinetic friction.

A 70 kg man stands in contact against the inner wall of a cylindrical drum of radius 3m rotating about a vertical axis at 200 rev/min. The coefficient of friction between the wall and the man is 0.15. What is the minimum rotational speed of the drum to enable the man to remain stuck to the wall?

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$$G = 6.6 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$$

**SECTION-A**

Q1. Write the value of the following :

(a)  $\hat{i} \times \hat{j}$

(b)  $\hat{k} \cdot (\hat{i} \times \hat{k})$

Q2. What is the maximum velocity of the wave represented by  $y(x, t) = 5 \sin(6\pi t - 4x)$ ?Q3. What will happen to a body projected at an angle of  $60^\circ$  with horizontal from the surface of earth with initial speed of 12.5 km/s?



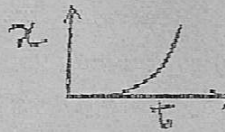
- Q4. Keeping the angle of projection same, what is the effect on the horizontal range of a projectile when its initial velocity is doubled?
- Q5. Write the value of degrees of freedom for a monoatomic gas and hence find its  $C_v$ .

**SECTION-B**

- Q6. (a) Can a body has energy without having momentum? Explain.
- (b) A body of mass 4 kg initially at rest is subjected to a force of 16N. What is the KE acquired by the object at the end of 10s?
- Q7. The time of oscillation ( $t$ ) of a small liquid drop depends upon the density of the liquid ( $d$ ), radius of the drop ( $r$ ) and the surface tension of the liquid ( $S$ ). Prove

dimensionally that  $t^2 \propto \frac{dr^3}{S}$

- Q8. (a) What can you say about the nature of the motion if the distance covered by a body is found to be directly proportional to the square of time?
- (b) Adjoining figure shows the  $x-t$  plot of 1-d motion of a particle. Suggest a suitable physical context for this graph.



- Q9. A heat engine whose sink is at a temperature of 300K has an efficiency of 40%. By how much should the temperature of the source be increased so as to increase the efficiency to 60%?

OR

Calculate the fall in temperature of Helium, initially at 300K, when it expands adiabatically to 8 times its original volume. ( $\gamma = \frac{5}{3}$ )

- Q10. A simple pendulum performs SHM with an amplitude  $A$  and time period  $T$ . What is the speed of the pendulum when the displacement from the mean position is (a) equal to  $A$  (b) equal to  $A/2$ ?

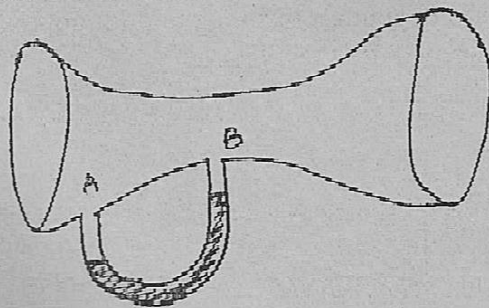
**SECTION-C**

- Q11. A child stands at the centre of a turntable with his arms outstretched. The table rotates at an angular speed of 40 revolutions/minute. How much will be the angular speed of the child if he folds his arms, thereby, reducing his moment of inertia to  $\frac{2}{5}$  times the initial value? Show that the child's new kinetic energy is more than the initial kinetic energy of rotation. How do you account for the increase in KE?

- Q12. (a) Find the angle between two forces,  $\vec{F}_1$  and  $\vec{F}_2$ , given as :  $\vec{F}_1 = 2\hat{i} + \hat{j} - \hat{k}$  N and  $\vec{F}_2 = 3\hat{i} - 4\hat{j} + \hat{k}$  N

- (b) A cricket ball of mass 150g is moving with a velocity of 12m/s and is hit by a bat, so that the ball is turned back with a velocity of 20m/s. The force of the blow acts for 0.01 sec. on the ball. Find the average force exerted by the bat on the ball.

- Q13. (a) Why does the mercury level stay higher below point B?



- (b) A liquid drop under no external force is always spherical in shape. Why?
- Q14. An artificial satellite of mass  $m$  revolves in a circular orbit of radius  $r$  around a planet of radius  $R$ . Find (a) the centripetal acceleration of the satellite (b) Time period of satellite (c) escape speed of the satellite from this distance.
- Q15. A body is projected horizontally from the top of a building of height  $h$  with initial speed  $u$ . Find -
- the time it will take to reach the ground.
  - horizontal distance from the foot of building where it will strike the ground.
  - the time at which the horizontal and vertical components of the final speed are equal, if the object is thrown with an initial horizontal speed of  $3s$ .

OR

- A swimmer can swim with velocity of  $10 \text{ km/h}$  in still water. River flows with a velocity of  $5 \text{ km/h}$ . In what direction should he swim to reach the point on the other bank just opposite to his starting point?
  - Two cars are going in two concentric circular paths of radius  $r_1$  and  $r_2$ . The time taken by the cars to complete the circular path is same. What is the ratio of their linear velocity?
- Q16. (a) Write the Hooke's law of elasticity.
- (b) Figure shows stress-strain curve for a material. What are (i) Young's modulus and (ii) approximate yield strength for this material.



(4)

Q17. State Newton's law of cooling and represent it graphically as well. In a room, where the temperature is  $30^{\circ}\text{C}$ , a body cools from  $61^{\circ}$  to  $59^{\circ}\text{C}$  in 4 minutes. What time will the body take to cool from  $51^{\circ}\text{C}$  to  $49^{\circ}$  in the same room?

Q18. (a) The moon is observed from two diametrically opposite points A and B on Earth. The angle  $\theta$  subtended at the moon is  $1^{\circ}54'$ . If the diameter of Earth is  $1.2 \times 10^7$  m, compute the distance of Moon from Earth.

(b) Percentage error in the measurement of height and radius of a cylinder are  $x$  and  $y$  respectively. Find the percentage error in the measurement of volume.

Q19. (a) A stone is dropped from rest from a height  $h$ . Prove that the mechanical energy of the stone at any point in its path is  $mgh$ .

(b) Show that in case of one dimensional elastic collision of two bodies, the relative velocity of separation after collision is equal to the relative velocity of approach before the collision.

Q20. (a) An SHM is represented by :

$$x = 5 \sin 4\pi t + 5\sqrt{3} \cos 4\pi t. \text{ Find its amplitude.}$$

(b) For a particle to travel from  $x = 0$  to  $x = A/2$  is  $t_1$  and from  $x = A/2$  to  $x = A$  is  $t_2$ . Find  $t_1/t_2$ .

Q21. State 1<sup>st</sup> law of thermodynamics. Using this law, derive relationship between  $C_p$  and  $C_v$ .

Q22. A body moving with uniform acceleration covers 12m in 3<sup>rd</sup> second and 20m in the 5<sup>th</sup> second of its motion. Find the velocity of the body after 10 seconds.

#### SECTION-D

Q23. Raju had seen his mother grinding flour in the grindstone since his childhood. He felt very helpless as his mother had to put in a lot of effort. As he grew older, he thought of

an idea and connected a small electric motor to the wheels of the grindstone. Now it became easier to get flour and Raju's mother was very happy and felt proud of her son.

- (i) What does his show about Raju?
- (ii) Calculate the maximum force generated by the motor if the radius of the grindstone is 0.8m and the torque produced by the motor is 120 Nm.
- (iii) What is the relation between torque and angular acceleration?

**SECTION-E**

- Q24. (a) Discuss the formation of stationary waves in stretched strings. Show that in a stretched string, the first four harmonics are in the ratio 1:2:3:4.
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ANNUAL EXAMINATION

2/2018

CLASS : XI

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 High Level Language and Low Level Language. (1)
- (b) (i) Describe the term open source software. (1)  
(ii) Explain any two types of bus. (2)
- (c) Convert the following : (3)  
(i)  $(92473)_{10}$  to octal.  
(ii)  $(1010110101)_2$  to hexadecimal.  
(iii)  $(3567)_8$  to binary.
- (d) Find the 8 bits two's complement form of the following decimal number. (1)  
-87
- (e) What is a real time operating system? (1)
- (f) Name two main types of cache memory. (1)
- Q2. (a) (i) What do you mean by encapsulation? Explain with an example. (2)  
(ii) What is Inheritance? Explain with an example. (2)
- (b) (i) Draw a flow chart to find the largest of three given numbers. (2)  
(ii) Identify the following as valid or invalid variable. Also give reason for each. (1)  
(b1) Struct (b2) int  
(b3) Adno. (b4) 11B

(1)

(c) Write the loop part to print the following : (2)

```

5   5   5   5   5
4   4   4   4
3   3   3
2   2
1

```

(d) What is the difference between / and % operator. (1)

Q3. (a) Write a program to compute simple interest. (2)

(b) Write the declaration of the following : (1+1+2=4)

- (i) a constant integer variable 'c' with value 100.
- (ii) an array 'a' consist of 10 float numbers.
- (iii) a product structure that holds product number, name, price and quantity.

(c) Explain the following data types with an example :

- (i) Float (ii) Reference (3)
- (iii) Enumerator

(d) What is the use of goto statement? (1)

Q4. (a) Write a program to input n numbers and to arrange all numbers in descending orders. (3)

(b) #include<iostream.h> (2+2=4)

```

void main()
{
    int sum=0;
    for(int i=2; i<=20; i+=2)
    {
        cout<<i<<' ';
        sum+=i;
    }
    cout<<"\nSUM="<<sum;
}

```

- (i) Convert the above program using while loop.
- (ii) Write the output of the above code and explain.

(c) Go through the C++ code shown below, and find out the possible output or outputs from the suggested



Output Options (i) to (iv). Also, write the least value and highest value, which can be assigned to the variable Guess. (2)

```
#include<iostream.h>
#include<stdlib.h>
void main( )
{
    randomize( );
    int Guess, High=4;
    Guess=random(High)+50;
    for (int C=Guess; C<=55; C++)
    cout<<C<<"#";
}
```

(i) 50 # 51 # 52 # 53 # 54 # 55 #

(ii) 52 # 53 # 54 # 55

(iii) 53 # 54 #

(iv) 51 # 52 # 53 # 54 # 55

(d) What is the purpose of # define? (1)

Q5. (a) Write the names of the header files, which is/are essentially required to run/execute the following C++ code : (2)

```
void main( )
{
    char C, String[ ] = "Excellence Overload";
    int len=strlen(String);
    cout<<sqrt(len);
    for (int l=0; l<len; l++)
    if (String[l] == ' ')
    cout<<endl;
    else
    {
        C=tolower(String[l]);cout<<C;
    }
}
```

(3)

- (b) Explain the following with an example. (4)
- (i) Logical Errors (ii) File scope  
(iii) Comments (iv) Iterative statement
- (c) Write a function to pass a number and to check whether the number is prime or not. If prime return one, otherwise zero. (3)
- (d) What is actual parameter? (1)
- Q6. (a) Write a program to print the following Fibonacci series. (3)
- 0, 1, 1, 2, 3, 5, 8, ..... n terms
- (b) Write a program to input any matrix and to display sum of row elements of the matrix. (3)
- (c) Write a program to implement reverse the array without using temporary array. (3)
- (d) What is the purpose of sizeof operator? (1)
- Q7. (a) Write a program to create the structure to represent distance (feet and inches) and implement the following : (4)
- (i) To add two distances.  
(ii) Difference between distances.
- (b) Give the output of the following program : (3)

```
#include<iostream.h>
struct pixel
{ int c, r;
};
void display (pixel p)
{
    cout<<"Column="<<p.c<<"Row="<<p.r;
}
void main( )
{
    pixel x=(150, 200), y, z;
    z=x;
```

(4)

```
z.c+=50;
y=z;
y.c=20;
x.r+=100;
z.r+=50;
display(x);
display(y);
display(z);
}
```

- (c) Give the output of the following program segment (Assuming all required header files are included in the program) ; (2)

```
#include<iostream.h>
#include<<ctype.h>
void main( )
{
    char Mystring[ ]="what@ANIDeal";
    for(int l=0; Mystring [l] != '\0'; l++)
    {
        if(!isalpha (Mystring[l]))
            Mystring[l]='$';
        else if(islower (Mystring[l]))
            Mystring[l]=Mystring[l]+1;
        else
            Mystring[l]=Mystring[l+1];
    }
    cout<<Mystring;
}
```

- (d) Write any two characteristics of good program. (1)

ANNUAL EXAMINATION

2/2018

CLASS : XI

SUBJECT : BIOLOGY

Time : 3 hrs.

M.M. : 70

*General Instructions :*

- (i) *There are a total of 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. An examinee is to attempt any one of the questions out of the two given in the question paper with the same question number.*

SECTION-A

- Q1. Name an animal which exhibits the phenomenon of bioluminescence. Mention the phylum to which it belongs. (1)
- Q2.  $F_0 - F_1$  particles participate in the synthesis of a molecule 'X'. Identify 'X'. (1)
- Q3. Write the appropriate type of animal tissues in column B according to the functions mentioned in column A. (1)

(1)

Column A

Column B

(a) Protective covering

(i) \_\_\_\_\_

(b) Linking and supporting framework

(ii) \_\_\_\_\_

Q4. Name the enzyme that digests fat. Give the end product of fat digestion. (1)

Q5. State the difference between centriole and cilia with respect to the tubular arrangement. (1)

#### SECTION-B

Q6. A plant may have different names in different regions of the country or world. How do botanists solve this problem? (2)

Q7. Where is the casparian strip located in the plants? Explain its role in water movement. (2)

OR

What is common to Nepenthes, Utricularia and Drosera with regard to mode of nutrition? (2)

Q8. How does gaseous exchange take place across the capillaries lining the human lungs. (2)

Q9. Epidermal cells are often modified to perform specialised functions in plants. Name any two such structures and mention the function they perform. (2)

Q10. How are ligases different from lyases. (2)

#### SECTION-C

Q11. (a) With the help of a diagram describe the haplo-diplontic life cycle pattern of a plant group.

(b) Mannitol is the reserve food material in which group of algae. (3)

Q12. (a) Describe vexillary aestivation along with a diagram.

(b) When are stamens described as epipetalous? (3)

(2)

Q13. Explain an ECG with the help of a diagram. (3)

Q14. Give the biochemical composition of plasma membrane.

How are its different constituent molecules arranged in the membrane? (3)

Q15. (a) What is the composition of the neurosensory layer of an eye.

(b) What connects the middle ear cavity with the pharynx, state its function

(c) State the function of Medulla and hypothalamus. (3)

Q16. Name the three substages of interphase and describe the events in each of them. (3)

Q17. Endomembrane structures form important part of all cells. Name any two endomembrane structures found in cells and state the function performed by them. (3)

Q18. (a) Enlist the conditions that are essential for the growth of a plant.

(b) What is arithmetic growth? (3)

Q19. (a) Name the respective mineral nutrient, that -

(i) forms the core constituent of the ring structure of chlorophyll.

(ii) forms the component of nitrogenase

(iii) synthesises middle lamella of plant cells.

(iv) is involved in phosphorylation reactions.

(b) Mention any two common symptoms of mineral deficiencies in plants. (3)

(3)

- Q20. (a) Photorespiration is a wasteful process. Give reason.  
(b) Explain the adaptive mechanism in maize and sorghum to avoid photorespiration. (3)

Q21. Explain the mechanism of urine formation in humans.

OR

Explain the following events of a cardiac cycle.

- (i) Atrial Systole (ii) Ventricular Systole  
(iii) Ventricular Diastole (3)

Q22. Write the functions of the following hormones in human body :

- (a) LH (b) Glucagon  
(c) Vasopressin (3)

#### SECTION-D

Q23. Sneha suffers from blood pressure and her doctor advised her to start medication to control her blood pressure, but she is reluctant to take medicines. Her friend, Lakshita tries to convince her to take the medicine.

- (a) Mention the normal blood pressure of a healthy person.  
(b) Which organs can be affected due to high blood pressure? (Name any two organs).  
(c) What values do you observe in Lakshita? Write any two values. (4)

#### SECTION-E

Q24. How does the mechanism of muscle contraction take place in humans? Explain.

OR

- (a) Draw a well labelled diagram to show the L.S. of human kidney.

(4)

(b) Describe the location of juxtaglomerular apparatus in human kidney. Explain its excretory and hormonal role. (5)

Q25. (a) Draw a neat labeled diagram of the vertical section of a maize grain.

(b) Based on the position of calyx, corolla and androecium with respect to ovary on thalamus, flowers are classified into three categories. Name and describe them.

OR

(a) Give the structural and functional differences between parenchyma and collenchyma.

(b) What are conjoint and radial vascular bundles? Where are they found? —

(c) Name the type of tissue that are the cause of grittiness in pulp of pear. (5)

Q26. (a) Describe the process of nodule formation in roots of leguminous plants.

(b) In most plants the terminal bud suppresses the development of lateral buds. What is this phenomenon called? Name one phytohormone that can promote this phenomenon.

OR

(a) Explain the process of cyclic photophosphorylation.

(b) What is the role of oxygen in the process of aerobic respiration.

(c) Give the complete energy analysis from TCA. (5)

(c)



Time : 3 Hrs.

M.M.: 70

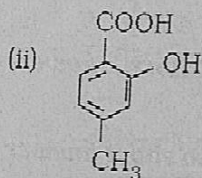
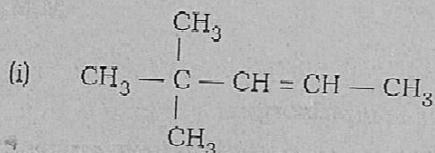
**General Instructions :**

- 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. What is the number of d-electrons in  $\text{Cr}^{3+}$  ion?
- Q2. Arrange B, C, N, O in increasing order of their ionisation enthalpy.
- Q3. How many significant figures are present in 0.00413?
- Q4. Why  $\text{H}_2\text{O}_2$  is stored in wax lined glass bottles in dark?
- Q5. Classify the following as Lewis acid or Lewis base :  
 $\text{H}_2\text{O}$ ,  $\text{NH}_3$  and  $\text{BF}_3$
- Q6. Calculate the concentration of nitric acid in moles per litre in a sample which has density  $1.40\text{g ml}^{-1}$  and the mass percent of nitric acid in it being 69%.
- Q7. (a) What do you understand by surface tension of a liquid?

(b) How are vapour pressure and intermolecular forces in liquids related?

Q8. Write the IUPAC names of following :



Q9. During a process, a system absorbs 160 KJ of heat and does work. The change in internal energy,  $\Delta U$  for the process is 460 J. What is the work done by the system?

OR

- (a) Why does entropy of a solid increase on fusion?  
(b) What is the criteria for spontaneity in terms of free energy change?

Q10. An organic compound contain 93.71% carbon and 6.29% hydrogen. If its molecular mass is 128g, calculate its molecular formula.

Q11. Give reason for the following :

- (i) Electron gain enthalpy of fluorine is less negative than that of chlorine.  
(ii) Na and  $\text{Mg}^+$  have same number of electrons but removal of electron from  $\text{Mg}^+$  requires more energy.  
(iii)  $\Delta_f H_2$  value of an element is always more than that of its  $\Delta_f H_1$  value.

Q12. (a) All the C-O bonds in carbonate ion ( $\text{CO}_3^{2-}$ ) are equal in length. Explain.

- (b) Explain why the bond angle in  $\text{NH}_3$  is greater than that of  $\text{H}_2\text{O}$ ?
- (c) HF is more polar than HI. Explain.
- Q13. (a) A sample of gas occupies 12.5 litre under a pressure of 1.5 atmosphere. What will be its volume if the pressure is increased to 3.5 atmosphere? Assume that the temperature of the gas sample does not change.
- (b) How is the pressure of a gas in a mixture related to the total pressure of the mixture?

OR

2.9g of gas at  $95^\circ\text{C}$  occupied the same volume as 0.184g of dihydrogen at  $17^\circ\text{C}$  at the same pressure. What is molar mass of the gas?

Q14. Balance the following redox reaction in acidic medium :



Q15. For the reaction :  $2\text{A}(\text{g}) + \text{B}(\text{g}) \longrightarrow 2\text{D}(\text{g})$

$$\Delta U^\circ = -10.5 \text{ KJ and } \Delta S^\circ = -44.1 \text{ JK}^{-1} \text{ mol}^{-1}$$

Calculate  $\Delta G^\circ$  for the reaction and predict whether the reaction may occur spontaneously or not.

- Q16. (a) What is coal gasification? How can the production of dihydrogen, obtained from 'coal gasification', be increased?
- (b) Do you expect the carbon hydrides of the type  $(\text{C}_n\text{H}_{2n+2})$  to act as 'Lewis' acid or base? Justify your answer.

Q17. Give reasons for the following :

- (i) Beryllium and magnesium do not give colour to the flame whereas other alkaline earth metals do so.
- (ii) Lithium salts are commonly hydrated and those of other alkali metal ions are usually anhydrous.

- (iii) BeO is insoluble but  $\text{BeSO}_4$  is soluble in water.
- Q18. Explain the following reactions, giving suitable example of each :
- Wurtz Reaction
  - Markovnikov's addition
  - Friedal-Crafts alkylation
- Q19. What happens when :
- Boric acid is added to water
  - Aluminium is treated with dil. NaOH
  - Diborane is treated with ammonia.
- Q20. Account for the following :
- Boron trihalides act as Lewis acids
  - Aluminium wire is used to make transmission cables
  - Atomic radius of gallium (135 pm) is less than that of aluminium (143 pm)
- Q21. (a) Which is more acidic : ethene or ethyne? Also give reason for your answer.
- (b) In sulphur estimation 0.157g of an organic compound gave 0.4813g of barium sulphate. What is the percentage of sulphur in the compound? (Given atomic mass of Ba = 137g, S = 32g, O = 16g)
- Q22. (a) Draw the shape of  $\text{XeF}_4$  molecule on the basis of VSEPR theory.
- (b) Write the molecular orbital configuration of  $\text{O}_2^+$ . Calculate its bond order and predict its magnetic behaviour.
- Q23. Mrs. Sharma disposes off domestic wastes in MCD dustbins. She puts biodegradable wastes in a separate dustbin and non-biodegradable in other dustbin. Mrs. Verma throws away all types of wastes outside her house which create lot of problems for other residents.

- (i) Why should Municipal Corporation of Delhi (MCD) separate biodegradable and non-biodegradable wastes?
  - (ii) What should be done with non-biodegradable wastes?
  - (iii) Why has government banned plastic in Delhi?
  - (iv) What values are possessed by Mrs. Sharma?
- Q24. (a) The threshold frequency  $\nu_0$  for a metal is  $7 \times 10^{14} \text{ sec}^{-1}$ . Calculate the kinetic energy of an electron emitted when radiation of frequency  $\nu = 1 \times 10^{15} \text{ sec}^{-1}$  hits the metal.
- (b) Calculate the total number of electrons present in 1 mole of methane.
  - (c) What is the lowest value of 'n' that allows 'f' orbital to exist?
  - (d) Define Heisenberg's Uncertainty Principle.

OR

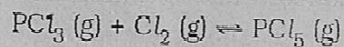
- (a) What is the energy in joules, required to shift the electron of a hydrogen atom from first Bohr orbit to fifth Bohr orbit and what is the wavelength of the light emitted when the electrons return to the ground state? The ground state electron energy is  $-2.18 \times 10^{-18}$  Joules.
  - (b) An electron is in one of the 5d orbitals. Give the possible values of l and ml for this electron.
  - (c) Which series of hydrogen spectrum is observed in visible region?
- Q25. (a) How will you bring about the following conversions :
- (i) Benzene into m-nitrochlorobenzene
  - (ii) Propene into 1-bromopropane
  - (iii) Ethyne into benzene
- (b) Why do alkynes not show geometrical isomerism?

- (c) Arrange primary, secondary and tertiary carbocations on the basis of their decreasing stability.

OR

- (a) Draw the resonating structures of nitrobenzene.  
(b) Out of cis and trans isomer of Hex 3 ene, which isomer will have higher boiling point and why.  
(c) An alkene 'A' on ozonolysis gives a mixture of ethanal and pentan-3-one. Write structure and IUPAC name of 'A'.
- Q26. (a) At equilibrium, the amount of each of the reactants and products remains constant. Does it mean that the reaction has stopped? Explain.

- (b) For the given equilibrium reaction :



$K_c = 0.18$  at  $27^\circ\text{C}$ . At a certain instant of time

$[\text{PCl}_3] = 0.042\text{M}$ ,  $[\text{Cl}_2] = 0.024\text{M}$ ,  $[\text{PCl}_5] = 0.005\text{M}$

- (i) Is the system in a state of equilibrium?  
(ii) If not, in which direction the reaction will proceed to come to equilibrium?
- (c) What do you mean by buffer solution?

OR

- (a) Consider the equilibrium :
- $$\text{N}_2\text{O} (\text{g}) + \text{NO}_2 (\text{g}) \rightleftharpoons 3\text{NO} (\text{g}) \quad \Delta H^\circ = +155.7 \text{ KJ mol}^{-1}$$
- In which direction will this equilibrium be shifted by the following changes?
- (i) addition of  $\text{NO}(\text{g})$   
(ii) increasing the temperature of the reaction mixture  
(iii) increasing the pressure
- (b) If solubility product for  $\text{CaF}_2$  is  $1.7 \times 10^{-10}$  at  $298\text{K}$ . Calculate its solubility in  $\text{mol L}^{-1}$ .

(6)