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## 12th Science

### Board Papers - March 2019

**1. Physics**

**2. Chemistry**

**3. Biology**

**4. Maths**

# BOARD QUESTION PAPER : MARCH 2019

## PHYSICS

**Note:**

- i. All questions are compulsory.
- ii. Draw neat, labelled diagrams wherever necessary.
- iii. Question paper consists of **29** questions divided into **FOUR** sections namely **A, B, C** and **D**.
- iv. **Section A:** Select and write the most appropriate answer from the given alternative for Q. No.1 to 4 of **multiple choice** type questions carrying **one mark** each and Q.No.5 to 8 are **very short answer** type of questions carrying **one mark** each.
- v. **Section B:** contains Q. No. 9 to 15 of **short answer-I** type questions carrying **two marks** each. Internal choice is provided to **only one** question.
- vi. **Section C:** contains Q. No. 16 to 26 of **short answer-II** type of questions carrying **three marks** each. Internal choice is provided to **only one** question.
- vii. **Section D:** contains Q. No. 27 to 29 of **long answer** type of questions carrying **five marks** each. Internal choice is provided to **each** question.
- viii. For each **MCQ**, correct answer must be written along with its alphabet, **e.g., (A) ..... / (B) ..... / (C) ..... / (D) ..... etc.**
- ix. In case of **MCQs**, (i.e. Q. No. 1 to 4) evaluation would be done for the **first attempt** only.
- x. Start each section on new page.
- xi. Figures to the right indicate full marks.
- xii. Use logarithmic table, if necessary. Use of calculator is **not** allowed.
- xiii. Write proper units wherever necessary as per standard rules.

**Physical Constants:**

- |   |   |
|---|---|
| (1) $\pi = 3.142$                         | (2) Charge on proton, $e^+ = 1.6 \times 10^{-19} \text{ C}$ |
| (3) $h = 6.63 \times 10^{-34} \text{ Js}$ | (4) $m_p = 1.67 \times 10^{-27} \text{ kg}$                 |
| (5) $c = 3 \times 10^8 \text{ m/s}$       |   |

## SECTION A

[8]

- Q.1** When a sparingly soluble substance like alcohol is dissolved in water, surface tension of water (1)
- |                      |                      |
|----------------------|----------------------|
| (A) increases        | (B) decreases        |
| (C) remains constant | (D) becomes infinite |
- Q.2** The specific heat capacity of water is (1)
- |          |                    |
|----------|--------------------|
| (A) $8R$ | (B) $\frac{7}{8}R$ |
| (C) $9R$ | (D) $\frac{9}{7}R$ |
- Q.3** The electric field intensity outside the charged conducting sphere of radius 'R', placed in a medium of permittivity  $\epsilon$  at a distance 'r' from the centre of the sphere in terms of surface charge density  $\sigma$  is (1)
- |  |  |
|--|--|
| (A) $\frac{\sigma}{\epsilon} \left( \frac{R}{r} \right)^2$   | (B) $\frac{\sigma}{\epsilon} \left( \frac{r}{R} \right)^2$ |
| (C) $\frac{\sigma}{\epsilon} \left( \frac{R}{r^2} \right)^2$ | (D) $\frac{\epsilon}{\sigma} \left( \frac{r}{R} \right)^2$ |

- Q.4** An electron of energy 150 eV has wavelength of  $10^{-10}$  m. The wavelength of a 0.60 keV electron is (1)  
(A) 0.50 Å (B) 0.75 Å  
(C) 1.2 Å (D) 1.5 Å
- Q.5** What is the value of tangential acceleration in U.C.M. ? (1)
- Q.6** What happens to a ferromagnetic substance heated above Curie temperature? (1)
- Q.7** At which position of the plane of the rotating coil with the direction of magnetic field, the e.m.f. induced in the coil is maximum? (1)
- Q.8** Name the logic gate which generates high output when at least one input is high. (1)

**SECTION B**

[14]

- Q.9** In Young's experiment interference bands were produced on a screen placed at 150 cm from two slits, 0.15 mm apart and illuminated by the light of wavelength 6500 Å. Calculate the fringe width. (2)
- Q.10** The susceptibility of magnetism at 300 K is  $1.2 \times 10^{-15}$ . What will be its susceptibility at 200 K? (2)
- Q.11** The length of the second's pendulum in a clock is increased to 4 times its initial length. Calculate the number of oscillations completed by the new pendulum in one minute.

**OR**

A body of mass 1 kg is made to oscillate on a spring of force constant 15 N/m. Calculate (i) angular frequency (ii) frequency of vibrations. (2)

- Q.12** Define capacitance of a capacitor and its S.I. unit. (2)
- Q.13** Define radius of gyration. Write its physical significance. (2)
- Q.14** Distinguish between p - type and n - type semiconductors. (2)
- Q.15** Explain the terms (i) Transducer and (ii) Attenuation in communication system. (2)

**SECTION C**

[33]

- Q.16** Obtain expressions of energy of a particle at different positions in the vertical circular motion. (3)
- Q.17** Define binding energy and obtain an expression for binding energy of a satellite revolving in a circular orbit round the earth. (3)
- Q.18** State Hooke's law. Define elastic limit and modulus of elasticity. (3)
- Q.19** Obtain an expression for the rise of a liquid in a capillary tube. (3)
- Q.20** Explain the reflection of transverse and longitudinal waves from a denser medium and rarer medium. (3)
- Q.21** What is photoelectric effect?  
Define: (i) Stopping potential (ii) Photoelectric work function (3)
- Q.22** What is perfectly black body? Explain Ferry's black body. (3)
- Q.23** When a resistor of  $5 \Omega$  is connected across the cell, its terminal potential difference is balanced by 150 cm of potentiometer wire and when a resistance of  $10 \Omega$  is connected across the cell, the terminal potential difference is balanced by 175 cm of the same potentiometer wire. Find the balancing length when the cell is in open circuit and the internal resistance of the cell. (3)

- Q.24** A cyclotron is used to accelerate protons to a kinetic energy of 5 MeV. If the strength of magnetic field in the cyclotron is  $2T$ , find the radius and the frequency needed for the applied alternating voltage of the cyclotron. (Given: Velocity of proton =  $3 \times 10^7$  m/s) (3)
- Q.25** Assuming expression for impedance in a parallel resonant circuit, state the conditions for parallel resonance. Define resonant frequency and obtain an expression for it. (3)
- Q.26** Using an expression for energy of electron, obtain the Bohr's formula for hydrogen spectral lines. (3)
- OR**
- State the law of radioactive decay. Hence derive the relation  $N = N_0 e^{-\lambda t}$ . Represent it graphically. (3)

**SECTION D**

[15]

- Q.27** Show that even as well as odd harmonics are present as overtones in the case of an air column vibrating in a pipe open at both the ends. (3)
- A wheel of moment of inertia  $1 \text{ kg m}^2$  is rotating at a speed of  $30 \text{ rad/s}$ . Due to friction on the axis, it comes to rest in 10 minutes. Calculate the average torque of the friction. (2)
- OR**
- Explain the formation of stationary waves by the analytical method. Show that nodes and antinodes are equally spaced in stationary waves. (3)
- The radius of gyration of a body about an axis, at a distance of  $0.4 \text{ m}$  from its centre of mass is  $0.5 \text{ m}$ . Find its radius of gyration about a parallel axis passing through its centre of mass. (2)
- Q.28** Obtain an expression for potential energy of a particle performing S.H.M. What is the value of potential energy at (i) Mean position and (ii) Extreme position. (3)
- A stretched sonometer wire is in unison with a tuning fork. When the length of the wire is increased by 5%, the number of beats heard per second is 10. Find the frequency of the tuning fork. (2)
- OR**
- From differential equation of linear S.H.M., obtain an expression for acceleration, velocity and displacement of a particle performing S.H.M. (3)
- A sonometer wire 1 metre long weighing  $2 \text{ g}$  is in resonance with a tuning fork of frequency  $300 \text{ Hz}$ . Find tension in the sonometer wire. (2)
- Q.29** Explain refraction of light on the basis of wave theory. Hence prove the laws of refraction. (3)
- Two coherent sources of light having intensity  $81:1$  produce interference fringes. Calculate the ratio of intensities at the maxima and minima in the interference pattern. (2)
- OR**
- State Brewster's law and show that when light is incident at polarizing angle, the reflected and refracted rays are mutually perpendicular to each other. (3)
- Monochromatic light of wavelength  $4300 \text{ \AA}$  falls on a slit of width 'a'. For what value of 'a' the first maximum falls at  $30^\circ$ ? (2)

# BOARD QUESTION PAPER: MARCH 2019

## CHEMISTRY

**Notes:**

- i. All questions are compulsory.
- ii. Draw neat, labelled diagrams and write balanced chemical equations wherever necessary.
- iii. Question paper consists of **29** questions divided into **FOUR** sections, namely **A, B, C** and **D**.
- iv. **Section A:** Select and write the most appropriate answer from the given alternatives for Q. No **1** to **4** of **multiple choice** type questions carrying **one mark** each. Q. No **5** to **8** are **very short answer** type questions carrying **one mark** each.
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- ix. In case of **MCQs**, (i.e. Q. No. **1** to **4**), evaluation would be done for the first attempt only.
- x. Start each section on new page.
- xi. Figures to the right indicate full marks.
- xii. Use log table if necessary. Use of calculator is **not** allowed.

**Given:**

$$R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1},$$

Atomic weights: H = 1, C = 12, N = 14, O = 16, Cl = 35.

SECTION A

- Q.1** A compound used as pistachio flavour in ice cream is \_\_\_\_\_. (1) [8]  
 (A) vanillin (B) acetophenone  
 (C) muscone (D) butyraldehyde
- Q.2** Oxidation states of scandium are \_\_\_\_\_. (1)  
 (A) +1, +2 (B) +1, +3  
 (C) +2, +3 (D) +3, +4
- Q.3** In Van Arkel method for refining zirconium or titanium, the halogen used is \_\_\_\_\_. (1)  
 (A) fluorine (B) chlorine  
 (C) bromine (D) iodine
- Q.4** A system absorbs 6 kJ of heat and does 1.5 kJ of work on its surroundings. The change in internal energy is \_\_\_\_\_. (1)  
 (A) - 7.5 kJ (B) - 4.5 kJ  
 (C) + 4.5 kJ (D) + 7.5 kJ

- Q.5 Write the molecular formula of novestrol. (1)
- Q.6 Write the number of hydroxyl groups present in  $\alpha$ -D-(+) – Glucopyranose (trans). (1)
- Q.7 What is Nessler's reagent? (1)
- Q.8 What is the ratio of octahedral holes to the number of anions in hexagonal closed packed structure? (1)

**SECTION B**

- Q.9 What are ethers? How are they classified? (2) [14]
- Q.10 What are antacids? Write the main constituents of dettol. (2)
- Q.11 Draw a neat, labelled diagram of electrolytic cell for the extraction of aluminium. (2)
- Q.12 How many faradays of electricity are required to produce 6 g of Mg from  $MgCl_2$ ? (2)

**OR**

The molar conductivity of 0.05 M  $BaCl_2$  solution at 25 °C is  $223 \Omega^{-1} cm^2 mol^{-1}$ . What is its conductivity?

- Q.13 Derive van't Hoff general solution equation. (2)
- Q.14 Write the conditions for maximum work done by the system. (2)
- Q.15 Write balanced chemical equations for the following: (2)
- (i) Action of sodium metal on ethanol
  - (ii) Action of zinc dust on phenol

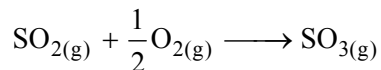
**SECTION C**

- Q.16 Write chemical reactions to prepare the following polymers: (3) [33]
- (i) Teflon
  - (ii) Nylon – 6
  - (iii) Dextron
- Q.17 How is glucose prepared by commercial method? How is peptide linkage formed? (3)
- Q.18 Write a short note on Hoffmann elimination. (3)
- Q.19 What is the action of the following on ethyl bromide (3)
- (i) alcoholic solutions of potassium hydroxide
  - (ii) moist silver oxide
  - (iii) silver acetate?
- Q.20 What is effective atomic number? Calculate effective atomic number of copper ( $Z = 29$ ) in  $[Cu(NH_3)_4]^{2+}$ . (3)
- Q.21 Write chemical reactions for differen steps in the manufacture of sulphuric acid by lead chamber process. Draw the structure of phosphorus pentachloride. (3)

**Q.22** Write Arrhenius equation. Derive an expression for temperature variations. (3)

**Q.23** Define electrochemical series. Write its applications. (3)

**Q.24** Calculate the work done in the following reaction at 50 °C. State whether work is done on the system or by the system. (3)



**OR**

The standard enthalpy of combustion of formaldehyde is  $\Delta_c H^\circ = -517$  kJ. How much heat will be evolved in the formation of 22 g of  $\text{CO}_2$ ?

**Q.25** Define the following terms: (3)

- (i) Isotonic solution
- (ii) Hypertonic solution
- (iii) Hypotonic solution

**Q. 26** Define Anisotropy. Distinguish between crystalline solids and amorphous solids. (3)

**SECTION D**

**Q. 27 (A)** Write the structure of phenylmethanamine. (1) [15]

**(B)** Write chemical equation for the following: (4)

- (i) Gatterman–Koch formylation
- (ii) Rosenmund reduction
- (iii) Fischer esterification
- (iv) Hell–Vohlard–Zelinsky reaction

**OR**

**(A)** What are amines? (1)

**(B)** How will you convert (4)

- (i) calcium acetate to acetaldehyde
- (ii) acetone to acetone cyanohydrin
- (iii) sodium acetate to methane
- (iv) benzoic acid to m-bromobenzoic acid?

**Q. 28 (A)** Define Enantiomers. (1)

**(B)** How is potassium dichromate prepared from chrome iron ore? (4)

**OR**

**(A)** What is Grignard reagent? (1)

**(B)** Explain the position of actinoids in the periodic table. (4)

What is the action of sulphur on lanthanoids?

Calculate the magnetic moment of divalent ion in aqueous solution if its atomic number is 24.

- Q. 29** (A) The rate of a first order reaction,  $A \rightarrow B$  is  $5.4 \times 10^{-6} \text{ Ms}^{-1}$  when  $[A]$  is 0.3 M. Calculate the rate constant of the reaction. (1)
- (B) Explain the following properties of group 16 elements: (4)
- (i) Electronegativity
  - (ii) Melting and boiling points
  - (iii) Metallic character
  - (iv) Allotropy

**OR**

- (A) The half life period of a first order reaction is 6.0 h. Calculate the rate constant. (1)
- (B) What are oxides? (4)
- Write different types of oxides with one example each.





# BOARD QUESTION PAPER : MARCH 2019

## MATHEMATICS AND STATISTICS

**Note:**

- (1) All questions are compulsory.
- (2) Figures to the right indicate full marks.
- (3) The Question paper consists of 30 questions divided into **FOUR** sections **A, B, C, D**.
  - Section A contains 6 questions of 1 mark each.
  - Section B contains 8 questions of 2 marks each. (One of them has internal option)
  - Section C contains 6 questions of 3 marks each. (Two of them have internal options)
  - Section D contains 10 questions of 4 marks each. (Three of them has internal options)
- (4) For each MCQ, correct answer must be written along with its **alphabet**, e.g., (A) ..... / (B) ..... / (C) ..... / (D) ..... etc. In case of MCQs, (Q. No. 1 to 6) evaluation would be done for the first attempt only.
- (5) Use of logarithmic table is allowed. Use of calculator is **not** allowed.
- (6) In L.P.P. only rough sketch of graph is expected. Graph paper is **not** necessary.
- (7) Start each section on new page only.

SECTION A

Select and write the most appropriate answer from the given alternative for each question:

1. The principal solutions of  $\cot x = -\sqrt{3}$  are \_\_\_\_\_ [1]
 

(A) $\frac{\pi}{6}, \frac{5\pi}{6}$	(B) $\frac{5\pi}{6}, \frac{7\pi}{6}$
(C) $\frac{5\pi}{6}, \frac{11\pi}{6}$	(D) $\frac{\pi}{6}, \frac{11\pi}{6}$
2. The acute angle between the two planes  $x + y + 2z = 3$  and  $3x - 2y + 2z = 7$  is \_\_\_\_\_ [1]
 

(A) $\sin^{-1}\left(\frac{5}{\sqrt{102}}\right)$	(B) $\cos^{-1}\left(\frac{5}{\sqrt{102}}\right)$
(C) $\sin^{-1}\left(\frac{15}{\sqrt{102}}\right)$	(D) $\cos^{-1}\left(\frac{15}{\sqrt{102}}\right)$
3. The direction ratios of the line which is perpendicular to the lines with direction ratios  $-1, 2, 2$  and  $0, 2, 1$  are \_\_\_\_\_ [1]
 

(A) $-2, -1, -2$	(B) $2, 1, 2$
(C) $2, -1, -2$	(D) $-2, 1, -2$
4. If  $f(x) = (1 + 2x)^{\frac{1}{x}}$ , for  $x \neq 0$  is continuous at  $x = 0$ , then  $f(0) =$  \_\_\_\_\_ [1]
 

(A) $e$	(B) $e^2$
(C) $0$	(D) $2$
5.  $\int \frac{dx}{9x^2 + 1} =$  \_\_\_\_\_ [1]
 

(A) $\frac{1}{3} \tan^{-1}(2x) + c$	(B) $\frac{1}{3} \tan^{-1} x + c$
(C) $\frac{1}{3} \tan^{-1}(3x) + c$	(D) $\frac{1}{3} \tan^{-1}(6x) + c$

6. If  $y = ae^{5x} + be^{-5x}$ , then the differential equation is \_\_\_\_\_ . [1]
- (A)  $\frac{d^2y}{dx^2} = 25y$  (B)  $\frac{d^2y}{dx^2} = -25y$
- (C)  $\frac{d^2y}{dx^2} = -5y$  (D)  $\frac{d^2y}{dx^2} = 5y$

**SECTION B**

7. Write the truth values of the following statements: [2]
- i. 2 is a rational number and  $\sqrt{2}$  is an irrational number.
- ii.  $2 + 3 = 5$  or  $\sqrt{2} + \sqrt{3} = \sqrt{5}$
8. Find the volume of the parallelepiped, if the coterminus edges are given by the vectors  $2\hat{i} + 5\hat{j} - 4\hat{k}$ ,  $5\hat{i} + 7\hat{j} + 5\hat{k}$ ,  $4\hat{i} + 5\hat{j} - 2\hat{k}$ . [2]

OR

Find the value of p, if the vectors  $\hat{i} - 2\hat{j} + \hat{k}$ ,  $2\hat{i} - 5\hat{j} + p\hat{k}$  and  $5\hat{i} - 9\hat{j} + 4\hat{k}$  are coplanar.

9. Show that the points A(-7, 4, -2), B(-2, 1, 0) and C (3, -2, 2) are collinear. [2]
10. Write the equation of the plane  $3x + 4y - 2z = 5$  in the vector form [2]
11. If  $y = x^x$ , find  $\frac{dy}{dx}$ . [2]
12. Find the equation of tangent to the curve  $y = x^2 + 4x + 1$  at (-1, -2). [2]
13. Evaluate:  $\int \frac{e^x(1+x)}{\cos^2(xe^x)} dx$  [2]
14. Evaluate:  $\int_0^{\frac{\pi}{2}} \sin^2 x dx$  [2]

**SECTION C**

15. In  $\Delta ABC$ , prove that [3]
- $$\sin\left(\frac{B-C}{2}\right) = \left(\frac{b-c}{a}\right) \cos\left(\frac{A}{2}\right)$$

OR

Show that  $\sin^{-1}\left(\frac{5}{13}\right) + \cos^{-1}\left(\frac{3}{5}\right) = \tan^{-1}\left(\frac{63}{16}\right)$

16. If A ( $\vec{a}$ ) and B ( $\vec{b}$ ) are any two points in the space and R ( $\vec{r}$ ) be a point on the line segment AB dividing it internally in the ratio m : n, then prove that  $\vec{r} = \frac{m\vec{b} + n\vec{a}}{m+n}$  [3]
17. The equation of a line is  $2x - 2 = 3y + 1 = 6z - 2$ , find its direction ratios and also find the vector equation of the line. [3]

18. Discuss the continuity of the function

$$f(x) = \frac{\log(2+x) \log(2-x)}{\tan x}, \quad \text{for } x \neq 0$$

$$= 1 \quad \text{for } x = 0$$

at the point  $x = 0$

[3]

19. The probability distribution of a random variable  $X$ , the number of defects per 10 meters of a fabric is given by

$x$	0	1	2	3	4
$P(X=x)$	0.45	0.35	0.15	0.03	0.02

Find the variance of  $X$ .

[3]

OR

For the following probability density function (p.d.f.) of  $X$ , find: (i)  $P(X < 1)$ , (ii)  $P(|X| < 1)$

$$\text{if } f(x) = \frac{x^2}{18}, \quad -3 < x < 3$$

$$0, \quad \text{otherwise}$$

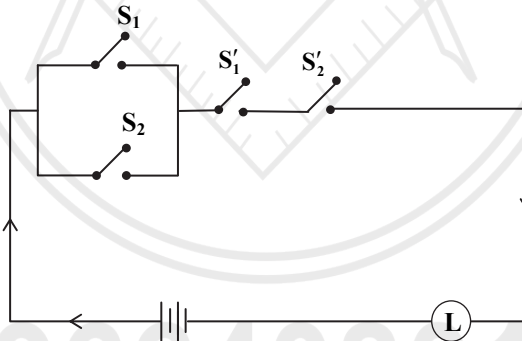
20. Given is  $X \sim B(n, p)$ .

If  $E(X) = 6$ ,  $\text{Var.}(X) = 4.2$ , find  $n$  and  $p$ .

[3]

**SECTION D**

21. Find the symbolic form of the given switching circuit. Construct its switching table and interpret your result.



[4]

22. If three numbers are added, their sum is 2. If two times the second number is subtracted from the sum of first and third numbers we get 8 and if three times the first number is added to the sum of second and third numbers we get 4. Find the numbers using matrices.

[4]

23. In  $\Delta ABC$ , with usual notations prove that  $b^2 = c^2 + a^2 - 2ca \cos B$

[4]

OR

In  $\Delta ABC$ , with usual notations prove that

$$(a-b)^2 \cos^2\left(\frac{C}{2}\right) + (a+b)^2 \sin^2\left(\frac{C}{2}\right) = c^2.$$

24. Find 'p' and 'q' if the equation  $px^2 - 8xy + 3y^2 + 14x + 2y + q = 0$  represents a pair of perpendicular lines.

[4]

25. Maximize:  $z = 3x + 5y$  Subject to  $3x + y \leq 21,$   
 $x + 4y \leq 24,$   $x \geq 0, y \geq 0$  [4]  
 $x + y \leq 9,$

26. If  $x = f(t)$  and  $y = g(t)$  are differentiable functions of  $t$ , then prove that  $y$  is a differentiable function of  $x$  and

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}, \text{ where } \frac{dx}{dt} \neq 0$$

- Hence find  $\frac{dy}{dx}$  if  $x = a \cos^2 t$  and  $y = a \sin^2 t$ . [4]

27.  $f(x) = (x-1)(x-2)(x-3)$ ,  $x \in [0, 4]$ , find 'c' if LMVT can be applied. [4]

OR

A rod of 108 meters long is bent to form a rectangle. Find its dimensions if the area is maximum.

28. prove that :  $\int \frac{dx}{\sqrt{x^2 + a^2}} = \log \left| x + \sqrt{x^2 + a^2} \right| + c$  [4]

29. Show that:  $\int_0^{\frac{\pi}{4}} \log(1 + \tan x) dx = \frac{\pi}{8} \log 2$  [4]

30. Solve the differential equation:

$$\frac{dy}{dx} + y \sec x = \tan x$$
 [4]

OR

Solve the differential equation:

$$(x+y) \frac{dy}{dx} = 1$$

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# BOARD QUESTION PAPER : MARCH 2019

## BIOLOGY

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- ix. In case of **MCQs**, (i.e. Q. No. 1 to 4) evaluation would be done for the **first attempt** only.
- x. Start each section on a new page.
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**SECTION A**

[8]

- Q.1** As the base sequence present on one strand of DNA decides the base sequence of other strand, this strand is considered as \_\_\_\_\_ (1)
- (A) Descending strand (B) Leading strand  
(C) Lagging strand (D) Complimentary strand
- Q.2** \_\_\_\_\_ shows haplo-diploid type of sex-determination. (1)
- (A) Pigeon (B) Honey bee  
(C) Parrot (D) Snake
- Q.3** Membrane bound receptors and hormones produce second messengers like \_\_\_\_\_. (1)
- (A) Renin (B)  $IP_3$   
(C) ANF (D) GHRF
- Q.4** During double fertilization second male gamete fuses with \_\_\_\_\_. (1)
- (A) antipodal cell (B) egg cell  
(C) secondary nucleus (D) synergids
- Q.5** What is Sinus arrhythmias? (1)
- Q.6** By which process ammonia is converted into urea in liver? (1)
- Q.7** Give the role of plasmids in bacterial cell. (1)
- Q.8** A person is showing symptoms like increased BMR, heart rate, pulse rate, blood pressure and deposition of fats in eye sockets. Name the disease he is suffering from. (1)

**SECTION B**

[20]

- Q.9** Define apiculture. Name the products obtained from it. (2)
- Q.10** Define biofertilizers. Give two types of fungal biofertilizers. (2)
- Q.11** Give the types of blood proteins and human hormones produced by recombinant DNA-technique. (2)
- Q.12** Write any two scientific and commercial values of transgenic animals in favour of human being. (2)
- Q.13** Define ‘Respiratory Quotient’ (RQ) and calculate the Respiratory Quotient for Carbohydrate. (2)
- Q.14** Light and dark reactions are interdependent – Explain. (2)
- Q.15** Classify the chromosomes on the basis of position of centromere. (2)
- Q.16** Sketch and label structure of male gametophyte in angiosperm. (2)
- Q.17** Match the following and rewrite: (2)

Group ‘A’		Group ‘B’	
i.	Diethyle Carbamacine	a.	AIDS
ii.	Widal test	b.	Pneumonia
iii.	Albendazole	c.	Filariasis
iv.	HAART	d.	Typhoid
		e.	Ascariasis

- Q.18** Complete the following chart and rewrite: (2)

	Agencies	Type of Pollination
i.	Water	.....
ii.	.....	Entomophily
iii.	Bat	.....
iv.	.....	Ornithophily

**OR**

- Explain outbreeding devices in angiospermic plants. (2)

**SECTION C**

[27]

- Q.19** What is Biofortification? Explain selective breeding with suitable example. (3)
- Q.20** In the light of Griffith’s experiment, explain the action of two strains of *Diplococcus pneumoniae* and give his conclusion. (3)
- Q.21** Give scientific reasons: (3)
- (A) The pyramid of energy is always upright.
  - (B) In an ecosystem the energy flow is always unidirectional.
  - (C) Ozone present in the stratosphere is called as “good ozone”.
- Q.22** Define ‘reproductive isolation’ and explain two types of reproductive isolation. (3)
- Q.23** Name the connecting link between glycolysis and TCA cycle and explain it. (3)
- Q.24** Explain internal structure of kidney with the help of suitable diagram. (3)

**Q.25** Explain the mechanism of reflex action with the help of a suitable diagram. (3)

**Q.26** Define pollution. “Industries are pouring poison in water”– Explain. (3)

**Q.27** With the help of a suitable diagram, describe ultra structure of the cell organelle, which is essential for photosynthesis. (3)

**OR**

**Q.27** During photosynthesis “O<sub>2</sub> is evolved from water molecule and not from CO<sub>2</sub>”. Give the experimental proof given by Robert Hill.

**SECTION D**

[15]

**Q.28** Explain with help of a suitable diagram conducting system of human heart. (5)

**OR**

Give reasons:

- (A) Lymphatic vessels are milky in appearance.
- (B) Monocytes are called scavengers.
- (C) The wall of left ventricle is thicker than right ventricle.
- (D) Valves are present in the veins.
- (E) Pulmonary veins carry oxygenated blood.

**Q.29** Which phenomenon gives 2:1 ratio instead of 3:1 ratio? Describe with graphical representation. (5)

**OR**

A pea plant homozygous for yellow round seed is crossed with its recessive parents. Calculate the phenotypic and genotypic ratio with the help of checker board.

**Q.30** After puberty human female shows cyclic changes in her reproductive system. Explain structural and hormonal changes in the uterus. (5)

**OR**

Give reasons:

- (A) Scrotal sac serves as thermoregulator.
- (B) Corpus luteum gets converted into corpus albicans in absence of fertilization.
- (C) Missing of menses is the first indication of pregnancy.
- (D) Surgical sterilization is a permanent method of birth control.
- (E) Human egg is microlecithal.