

- N.B. :** (1) All questions are compulsory.
 (2) Figures to the right indicate full marks.

1. (a) Choose the right alternative (any eight) : 8
- (i) Elimination of the government control over economic activities is known as -----.
 (Liberalization, Privatization, Globalization)
 - (ii) The Ministry of environment and forest has created information system called -----.
 (EIS, GIS, GPS)
 - (iii) The only important motive of all ----- companies is to maximise their profit.
 (Private, Public, Co-operative)
 - (iv) Human Rights are derived from the principle of ----- Law.
 (Government, Natural, Judicial)
 - (v) Indian constitution has incorporated ----- fundamental Rights.
 (8, 7, 6).
 - (vi) ----- is recognised as the international document of Human Rights.
 (UDHR, American Declaration, French Declaration)
 - (vii) Meat-eating animals are called as -----.
 (Herbivorous, Carnivorous, Omnivorous)
 - (viii) ----- factor is related to Physical, Mental or emotional disturbance.
 (Stress, aggression, conflict)
 - (ix) ----- is one of the causes of aggression.
 (Migration, Communalism, Urbanisation)
 - (x) Maslow's theory is related to -----.
 (Self Actualization, Stress, Agression)
- (b) State whether the following statements are true or false (any seven) : 7
- (i) Levitt introduced the concept of globalization.
 - (ii) IT has made communication simple and less expensive.
 - (iii) Freedom of speech and expression may also include defamation.
 - (iv) John Locke was recognized as the father of modern international Law.
 - (v) Natural environment provides renewable sources of energy.
 - (vi) Sustainable development has three components : environment, society and economy.
 - (vii) Basic human values help to improve standard of living in a society.
 - (viii) Regionalism is the only cause of aggression and violence.
 - (ix) Individual factors are the only causes of stress.
 - (x) Causes of stress are not the same for every individual.

2. What is meant by Globalization ? Explain the impact of Globalization on Indian economy. 15

OR

Explain the impact of Globalization on Agriculture.

3. Explain the meaning and characteristics of Human Rights. 15

OR

Examine the concept of civil rights. Describe any five civil rights.

4. Explain the concepts of environment and ecology and their interconnectedness. 15

OR

Explain the causes of environmental degradation.

5. Explain the meaning and causes of stress.

OR

Write short notes on (any three):

(a) Concept of Liberalization

(b) Problem of migration

(c) Food chain.

(d) Coping with stress

(e) Types of conflicts

15

- Note: 1) All questions are compulsory.
2) Use of non-programmable calculator is allowed.
3) Draw figures wherever necessary.
4) Symbols have their usual meanings unless mentioned.

Q.1 (A) Select the correct option

12

- i) If $\vec{A} = \hat{i} + 3\hat{j} - 2\hat{k}$ and $\vec{B} = 4\hat{i} - 2\hat{j} + 4\hat{k}$, then $|3\vec{A} + 2\vec{B}|$ is _____
(a) $\sqrt{150}$ (b) $\sqrt{15}$ (c) 150 (d) 25
- ii) Curl of electrostatic field is _____
(a) non-zero (b) constant
(c) zero (d) variable function
- iii) The order of a differential equation $L \frac{d^2q}{dt^2} + R \frac{dq}{dt} + \frac{q}{C} = E \sin \omega t$ is _____
(a) 0 (b) 1
(c) 2 (d) 3
- iv) The time constant of a CR circuit with $C=500\mu\text{F}$ and $R=50\text{K}\Omega$ is _____
(a) 5 sec (b) 15 sec
(c) 25 sec (d) 35 sec
- v) For a non-dispersive medium the relation between group velocity (v_g) and a phase velocity (v_p) _____
(a) $v_g = v_p$ (b) $v_g = \lambda v_p$
(c) $v_g = k v_p$ (d) $v_g = T v_p$
- vi) _____ waves do not transmit energy from one point to another.
(a) Longitudinal (b) Transverse
(c) Progressive (d) Stationary

(B) Answer in one sentence :

03

- i) What is the condition for the vectors \vec{A} , \vec{B} and \vec{C} to be coplanar?
ii) Define Partial differential equation.
iii) Define Group velocity of a wave.

(C) Fill in the blanks

05

- i) A vector whose initial and terminal points coincide is called _____ vector.
ii) The position vector of point P(2,2,2) with respect to origin is _____.
iii) The _____ in a series LR circuit is the time taken for the current to rise to 63% of its final maximum value.
iv) _____ can be defined as the periodic variation of intensity of wave at a given point due to superposition of two waves of slightly different frequencies travelling along the same direction.

- v) _____ is defined as oscillatory disturbance travelling through a medium.

Q.2 (A) Attempt any one

08

- i) What do you understand by scalar field and vector field? Explain it with the help of suitable two examples of each.
- ii) The linear velocity for the circular motion of the particle is $\vec{v} = \vec{\omega} \times \vec{r}$. Assuming ω to be constant, prove that, (a) $\nabla \times \vec{v} = 2\omega$ and (b) $\nabla \cdot \vec{v} = 0$

(B) Attempt any one

08

- i) What are scalar and vector triple product and give at least two properties of each.
- ii) Explain the operator Del. Define the divergence of a vector field and explain its physical meaning.

(C) Attempt any one

04

- i) Prove that $(\vec{A} \times \vec{B}) \cdot (\vec{C} \times \vec{D}) = (\vec{B} \cdot \vec{D})(\vec{A} \cdot \vec{C}) - (\vec{B} \cdot \vec{C})(\vec{A} \cdot \vec{D})$
- ii) Suppose $\vec{A} = x^2z^2\hat{i} - 2y^2z^2\hat{j} + xy^2z\hat{k}$. Find curl \vec{A}

Q.3 (A) Attempt any one

08

- i) Discuss the general first order linear differential equation with reference to complementary function and particular integral. Obtain its general solution.
- ii) A series combination of a capacitor of capacitance (C) and a resistor of resistance (R) is connected across a source of constant emf (E). Derive an expression for the charge (q) on the capacitor and current through the circuit during charging of the capacitor.

(B) Attempt any one

08

- i) Show that the following differential equation is exact and hence find its solution: $(2x + y + 1) dx + (2y + x + 1) dy = 0$.
- ii) A charged capacitor discharges through a series combination of an inductor and a resistance. Derive an expression for the discharge of a capacitor. Under what condition is the discharge oscillatory?

(C) Attempt any one

04

- i) A coil having a resistance of 15Ω and an inductance of $10H$ is connected to 90 volts supply. Determine the value of current after 2 seconds.
- ii) If N is the number of radionuclei in a sample at time t , then the rate of radioactive decay is proportional to N itself. The differential equation describing the radioactive decay is $\frac{dN}{dt} = -\lambda N$, where λ is called the decay constant. Solve the equation.

(Given: N_0 is the initial number of radionuclei in the sample.)

Q.4 (A) Attempt any one 08

- i) Discuss the composition of two parallel simple harmonic motion of the same period and with same centre but of different amplitudes and different phase constants. Show that the resultant motion is also a simple harmonic motion having the same period. Find the expression for the amplitude and resultant motion.
- ii) Define particle velocity and wave velocity.
Show that (particle velocity) = - (wave velocity) x (slope of the displacement curve).

(B) Attempt any one 08

- i) Discuss the composition of two perpendicular simple harmonic motions of the same period and show that the path of the resultant motion, in general is an inclined ellipse.
- ii) Derive the expression for the velocity of a simple harmonic wave in a stretched string.

(C) Attempt any one 04

- i) The equation of motion of a particle is given by $x = 5 \cos(3.14t + \frac{\pi}{6})$ in cm.
Find the period of oscillation and maximum acceleration of the particle.
- ii) A guitar string is 90cm long and has a fundamental frequency of 124 Hz. Where should it be pressed to produce a fundamental frequency of 186 Hz.

Q.5 Attempt any four 20

- i) Explain in brief (a) Collinear Vector (b) Position vector and Displacement vectors.
- ii) Find the area of triangle having vertices A(1,3,2), B(2,-1,1) and C(-1,2,3).
- iii) The given differential equation $(xy^2 + Ax^2y) dx + (x + y) x^2 dy = 0$ is exact. Find the value of A.
- iv) In LR series circuit, $L=100$ mH and $R=10\Omega$, is connected to a 50 volt battery. Calculate: (a) Time taken for the current to rise to half its steady voltage.
(b) Voltage drop across resistance after time $t = 0.02$ seconds.
(c) Voltage drop across inductance after time $t = 0.02$ seconds.
- v) What are Lissajous figure? State the factors on which the shape of the Lissajous figures depends.
- vi) A travelling wave propagates according to the given expression,
 $y = 0.02 \sin(100x - 2t)$, where y is the displacement at position x and time t. Determine the amplitude, wavelength, frequency and period of the wave.

- Note: 1) All questions are compulsory.
 2) Use of non-programmable calculator is allowed.
 3) Draw figures wherever necessary.
 4) Symbols have their usual meanings unless mentioned.

Q.1 (A) Select the correct option

12

i) At resonance, in a series LCR resonant circuit impedance is

- (a) purely inductive (b) purely capacitive
 (c) purely resistive (d) none of the above

ii) The r.m.s. value of sinusoidal voltage with amplitude E_0 is

- (a) $\frac{E_0}{\sqrt{2}}$ (b) $\frac{2E_0}{\sqrt{2}}$
 (c) $\frac{2E_0}{\pi}$ (d) zero

iii) A source delivers maximum power to load when source resistance is

- (a) less than the load (b) infinite
 (c) greater than the load (d) equal to the load

iv) The Zener diode is used as a

- (a) rectifier (b) clipper
 (c) voltage regulator (d) clamper

v) The Boolean expression $AB + A\bar{B} =$

- (a) B (b) 0
 (c) A (d) AB

vi) The electric potential, V in a region is given by $V=10x^2-10x+15$. The value of electric field at $x=2$ is

- (a) -30V/m (b) $+30\text{V/m}$
 (c) $+35\text{V/m}$ (d) $+15\text{V/m}$

(B) Answer in one sentence :

03

- i) State Superposition Theorem.
 ii) Which ac bridge is used to determine the frequency of the source?
 iii) Define Electric Field and state its unit.

(C) Fill in the blanks

05

- i) Force exerted on proton and electron in a given electric field E will be _____ in magnitude.
 ii) In case of an inductor and a capacitor, an average power delivered by ac source is _____.
 iii) As work done in static electric field is path independent, electric field is called _____.
 iv) For an ideal constant current source, internal resistance is _____.

- v) According to the Reciprocity theorem, positions of voltage source and ammeter in a circuit can be _____.

Q.2 (A) Attempt any one

08

- i) A sinusoidal voltage is applied across a series L-R circuit. Derive the expression to show that current lags the applied voltage. Draw the phasor diagram for voltages in LR circuit.
- ii) Show that in the case of AC circuits, while the potential drop across capacitor lags the current by 90° , the potential drop across inductor leads the current by 90° . Draw the phasor diagrams.

(B) Attempt any one

08

- i) Draw Maxwell's L/C bridge and obtain the conditions for balance.
- ii) A sinusoidal voltage is applied across a series LCR circuit. Derive an expression for the impedance of the circuit. Draw the phasor diagrams for voltages in the LCR circuit for the resonance condition, $\omega L = (1/\omega C)$.

(C) Attempt any one

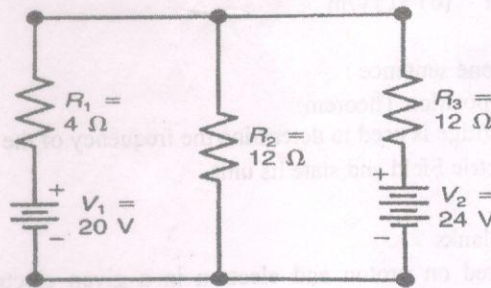
04

- i) The first ratio arm of De Sauty's bridge consists of a resistance 2400 ohm, second ratio arm consists of capacitance of 0.1 μF . The third ratio arm consists of resistance of 800 ohm, whereas fourth ratio arm consist of unknown capacitor. If the bridge is balanced find the capacitance of unknown capacitor?
- ii) In a parallel resonant circuit, $L=2\text{mH}$, $R=15\text{ ohm}$, $C=0.001\text{ }\mu\text{F}$. Calculate the frequency at which the current is minimum.

Q.3 (A) Attempt any one

08

- i) State and prove maximum power transfer theorem.
- ii) State Thevenin's theorem. Determine the Thevenin's equivalent of the circuit given below. Take R_2 as the load. Hence find Current flowing through R_2 and Voltage across R_2



(B) Attempt any one

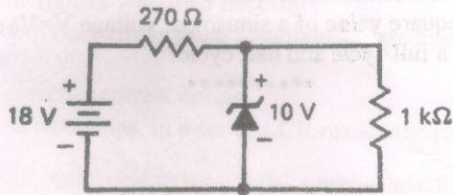
08

- i) Explain with neat diagram the working of bridge rectifier. Show the input and output waveforms.
- ii) What is meant by universal gates? Using NOR gate and NAND gate construct other basic gates. Write the Truth tables.

(C) Attempt any one

04

- i) Is the Zener diode operating in the breakdown region? If the Zener has maximum power dissipation of 250mW, what is the maximum current that should pass through the Zener diode?



- ii) Draw the circuit diagram of a positive clamper with capacitor of 0.1mF and a load resistor of 1M ohm. The input wave has amplitude of $\pm 8V$. What are the voltage levels at the output? Consider diode to be ideal.

Q.4 (A) Attempt any one

08

- i) Derive an expression for the potential energy of a discrete point charge distribution.
 ii) Derive an expression for the electrostatic potential due to uniformly charged circular disc of radius R at a point on its axis at a distance ' r ' from its center. Charge on the disc is equal to ' q '.

(B) Attempt any one

08

- i) Show that magnetic field produced by solenoid at its axis and well inside solenoid depends on current and number of turns per unit length.
 ii) Derive an expression for the magnetic field produced by current carrying wire of finite length at a point which is at distance ' x ' from the wire. Modify expression for magnetic field produced at the center of the current carrying square loop.

(C) Attempt any one

04

- i) A solenoid 0.5m long has 2000 turns. The magnetic field near the center of the solenoid is 0.01T. What is the current in the solenoid? Consider solenoid to be infinitely long.
 ii) A work done in moving charge of 0.1C from point A to point B, is equal to 500 mJ. What is the potential difference between two points A and B?

Q.5 Attempt any four

20

- i) Define Q factor for series resonance circuit and derive expression for it. What is its significance?
 ii) State any one of the De Morgan's theorems. Draw circuit equivalent of the theorem and prove it.
 iii) What is filter circuit? Explain in brief the action of capacitor filter.

- iv) Find the work done in bringing a charge Q from infinity to a point at the center of the square. A charge ' q ' is situated at each corner of the square. Side of the square = s
- v) Find an expression for the magnetic field at the center of the square loop. A square loop carries a steady current of ' I '.
- vi) Find root mean square value of a sinusoidal voltage $V = V_0 \sin \omega t$. What is its mean value over a full cycle and half cycle?

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16/04/2018
(3 Hours)

[Total Marks : 100

- N.B.: 1. All questions are compulsory.
2. Figures to the right indicate full marks.

Q.1 Choose correct alternative in each of the following: (20)

- i. The series $\sum_{n=1}^{\infty} 4$ of real numbers is a
(a) divergent series (b) convergent series
(c) alternating series (d) none of these

- ii. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$ is a series of real numbers which is a
(a) divergent series
(b) conditionally convergent series
(c) geometric series
(d) none of these

- iii. The series $\sum_{n=1}^{\infty} \frac{n^3}{4^n}$ is
(a) p - series (b) divergent series
(c) convergent series (d) none of these

- iv. The function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined as $f(x) = \begin{cases} 0, & x \leq 0 \\ x, & x > 0 \end{cases}$ is
(a) continuous (b) differentiable
(c) bounded (d) none of these

- v. The function $f(x) = |x|$, $x \in \mathbb{R}$ is
(a) differentiable at $x = 0$
(b) not differentiable at $x = 0$
(c) differentiable at any $x \in \mathbb{R}$
(d) none of these

- vi. If $y = e^{2x+3}$ then $\frac{d^4y}{dx^4}$ equals
(a) $16e^{2x+3}$ (b) $9e^{2x+3}$
(c) 16 (d) none of these

- vii. $f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right), & x \neq 0 \\ 0, & x = 0 \end{cases}$ then $f'(0)$ is
(a) 1 (b) 2
(c) 0 (d) none of these

- viii. The value of $\lim_{x \rightarrow 0} \frac{10^x - 1}{x}$ is
(a) 1 (b) $\log_{10} 10$
(c) $\log_e 10$ (d) none of these

- ix. $f(x) = x^3 - 12x + 1$ has local minima at
 (a) $x = 2$ (b) $x = -2$
 (c) $x = 0$ (d) none of these
- x. The function $f(x) = \log_e x$, $x > 0$ is
 (a) monotonic increasing (b) monotonic decreasing
 (c) bounded (d) none of these

Q.2 a) Attempt any ONE question from the following: (08)

- i. Prove that the alternating series $\sum_{n=1}^{\infty} (-1)^{n+1} a_n$ is convergent if it satisfies the following conditions:
 (I) $a_n \geq a_{n+1}$ for all $n \in \mathbb{N}$ i.e. sequence (a_n) is non-increasing.
 (II) $\lim_{n \rightarrow \infty} a_n = 0$
- ii. Prove the following limit form of comparison test:
 Let $\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} b_n$ be the series of non-negative real numbers with $b_n > 0, \forall n \in \mathbb{N}$. If $\lim_{n \rightarrow \infty} \left(\frac{a_n}{b_n}\right) = l > 0$ then $\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} b_n$ behave alike.

b) Attempt any TWO questions from the following: (12)

- i. Check whether the series $\sum_{n=1}^{\infty} \ln\left(1 + \frac{1}{n}\right)$ is convergent. Justify your answer.
- ii. Prove that a series $\sum_{n=1}^{\infty} a_n$ is convergent if and only if for every $\epsilon > 0$ there exist $n_0 \in \mathbb{N}$ such that
- $$\left| \sum_{k=n+1}^m a_k \right| < \epsilon, \forall m > n \geq n_0$$
- iii. Show that the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1} 2^n}{3n+1}$ is convergent. Is it absolutely convergent? Justify your answer.
- iv. Show that if the series $\sum_{n=1}^{\infty} a_n$ is convergent then sequence (a_n) converges to zero.

Q.3 a) Attempt any ONE question from the following: (08)

- i. Let $f: [a, b] \rightarrow \mathbb{R}$ be a continuous function. Show that f attains its bounds.
- ii. Let $f, g: \mathbb{R} \rightarrow \mathbb{R}$ be functions which are differentiable at $p \in \mathbb{R}$. Show that the functions $f + g$ and cf are differentiable at $p \in \mathbb{R}$ (where c is a constant in \mathbb{R}).

- b) Attempt any TWO questions from the following: (12)
- Prove that every differentiable function from \mathbb{R} to \mathbb{R} is continuous. Is the converse true? Justify your answer.
 - Show that $f(x) = x|x|$, $x \in \mathbb{R}$ is differentiable at $x = 0$.
 - For $n \in \mathbb{N}$, find the n^{th} order derivative of $y = x^3 \cos x$ using Leibnitz theorem.
 - Find $\frac{dy}{dx}$ for $y = x^2 y^3 + x^3 y^2$ (where y is a function of x).

- Q.4 a) Attempt any ONE question from the following: (08)
- State and prove Rolle's theorem.
 - Let $f: (a, b) \rightarrow \mathbb{R}$ be a function. When can we say f has local maximum at $c \in (a, b)$? Further, if f is twice differentiable at $c \in (a, b)$ with $f'(c) = 0$ and $f''(c) < 0$ then prove that f has local maximum at c .

- b) Attempt any TWO questions from the following: (12)
- Let $f: (a, b) \rightarrow \mathbb{R}$ be a function such that $f'(x) = 0$, for all $x \in (a, b)$. Prove that f is constant on (a, b) .
 - State Lagrange's Mean Value theorem and verify it for $f(x) = x^2 + 3x + 2$ on $[2, 5]$.
 - Let $f: (a, b) \rightarrow \mathbb{R}$ be a function. When do you say f is concave upwards? Further find values of x in \mathbb{R} for which $f(x) = 4x^4 - 3x^3$ is concave upwards.
 - Expand $f(x) = 4x^3 + 4x^2 - 2x + 9$ in powers of $(x - 2)$.

- Q.5 Attempt any FOUR questions from the following: (20)

a) Show that if the series $\sum_{n=1}^{\infty} a_n$ is absolutely convergent then it is convergent.

b) Check whether the following series is convergent:

$$\sum_{n=1}^{\infty} \frac{n^2 + 3}{n(n^3 + 4n - 1)}$$

Clearly state the results used.

c) Show that the equation $x^5 - 2x^3 - 2 = 0$ has a solution in \mathbb{R} .

d) For $n \in \mathbb{N}$, find y_n if $y = 2^{ax}$ where a is a constant in \mathbb{R} .

e) Find approximate value for $\log_e(1.2)$ by using first three terms in Taylor expansion.

f) State L-Hospital's rule and use it to find $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\cos^2(3x)}{\cos^2(x)}$

- N.B.: 1. All questions are compulsory.
 2. Figures to the right indicate full marks.

Q.1 Choose correct alternative in each of the following: (20)

- i. The system of equations $x - 2y + z = 0, x - y + 3z = 0$ has
 (a) Only the trivial solution (b) Infinitely many solutions
 (c) No solution (d) None of the above
- ii. Which of the following matrices is skew symmetric ?
 (a) $\begin{bmatrix} 0 & 3 & -2 \\ -3 & 0 & -4 \\ 2 & 4 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 2 & 2 \\ 2 & 0 & 4 \\ 3 & 4 & 0 \end{bmatrix}$
 (c) $\begin{bmatrix} 0 & 9 & 0 \\ 9 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$
- iii. The parametric representation of the line $2x + y = 5$ is
 (a) $x = 1 - 3t, y = 4 - 3t$ (b) $x = 2 - 3t, y = 2 - 3t$
 (c) $x = 2 + 3t, y = 1 - 6t$ (d) None of these
- iv. Which of the following sets is linearly dependent?
 (a) $\{(1,1), (4,4)\}$ (b) $\{(\frac{3}{2}, 0), (3,6)\}$
 (c) $\{(-2,2), (-6,0)\}$ (d) $\{(1,4), (0,4)\}$
- v. If $S_1 = \{(x, 0, 0) | x \in \mathbb{R}\}$ and $S_2 = \{(0, y, 0) | y \in \mathbb{R}\}$ are subspaces of \mathbb{R}^3 then
 (a) $S_1 \cup S_2$ is a subspace of \mathbb{R}^3 (b) $S_1 \cap S_2$ is not subspace of \mathbb{R}^3 .
 (c) $S_1 \cap S_2$ is a subspace of \mathbb{R}^3 (d) $S_1 \cup S_2 = \{(0,0,0)\}$
- vi. Which of the following sets is a generating set of \mathbb{R}^2 ?
 (a) $\{(1,2), (3,6)\}$ (b) $\{(1,3), (0,1)\}$
 (c) $\{(2,3), (8,12)\}$ (d) None of these
- vii. The rank of linear transformation $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ defined as
 $T(x, y, z) = (x, y, 0)$ is
 (a) 1 (b) 2
 (c) 3 (d) 0
- viii. The nullity of the linear transformation $T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined as
 $T(x, y) = (-y, x)$ is
 (a) 1 (b) 3
 (c) 2 (d) 0
- ix. If for a linear transformation $T: \mathbb{R}^5 \rightarrow \mathbb{R}^3$ the $\dim(\text{Im}(T)) = 2$ then $\text{null}(T)$ is
 (a) 4 (b) 3
 (c) 2 (d) 1
- x. Which of the following is a basis for $V = \{(x, y, z) \in \mathbb{R}^3 | z = y\}$?
 (a) $\{(1, 0, 0), (0, 1, 1)\}$ (b) $\{(1, 2, -1), (0, 1, -1)\}$
 (c) $\{(1, 0, 0), (0, 1, 0)\}$ (d) $\{(1, 0, 1), (0, 1, 1)\}$

Q.2 a) Attempt any ONE question from the following: (08)

- i. Let $a_1x + a_2y = 0$
 $b_1x + b_2y = 0$ be a system of linear equations. Prove that it has a non trivial solution if and only if $a_1b_2 - a_2b_1 = 0$.
- ii. Let A_1, A_2, \dots, A_n be any invertible matrices. Prove that $(A_1 A_2 \dots A_n)^{-1} = A_n^{-1} A_{n-1}^{-1} \dots A_1^{-1}$.

b) Attempt any TWO questions from the following: (12)

- i. If A is a diagonal matrix with diagonal elements a_1, a_2, \dots, a_n , find A^k for $k \in \mathbb{N}$.
- ii. Reduce the matrix $\begin{pmatrix} 3 & -2 & 4 & 5 \\ -1 & 3 & 2 & -2 \\ 2 & 4 & -5 & 3 \\ 4 & 5 & 1 & 6 \end{pmatrix}$ to row echelon form.
- iii. Solve the following system of linear equations:
 $x - 4y + 8z = 0,$
 $3x + y - 12z = 0.$
- iv. Let A be $m \times n$ matrix and $k \in \mathbb{R}$. Prove $(kA)^t = kA^t$.

Q.3 a) Attempt any ONE question from the following: (08)

- i. Let $V = \{a_0 + a_1x + a_2x^2 + a_3x^3 \mid a_i \in \mathbb{R}, i = 0,1,2,3\}$. Vector addition is defined by $\sum_{i=0}^3 a_i x^i + \sum_{i=0}^3 b_i x^i = \sum_{i=0}^3 (a_i + b_i) x^i$, for every $a_i, b_i \in \mathbb{R}$. Verify all properties of vector addition for vector space V over \mathbb{R} .
- ii. Define a vector subspace. Let W_1, W_2 be two subspaces of a vector space V over \mathbb{R} . Prove that $W_1 \cup W_2$ is a subspace of V if and only if either $W_1 \subseteq W_2$ or $W_2 \subseteq W_1$.

b) Attempt any TWO questions from the following: (12)

- i. Let V be a vector space over \mathbb{R} and $S \subseteq T \subseteq V$. Prove that $L(S) \subseteq L(T)$.
- ii. Let $V = \{(x_n) \mid x_n \in \mathbb{R}, \forall n \in \mathbb{N}\}$ be a set of all real sequences. Prove that $W = \{(x_n) \in V \mid \lim_{n \rightarrow \infty} x_n = 0\}$ is a vector subspace of V .
- iii. Let $V = \mathbb{R}^3$ is a vector space over \mathbb{R} , $S = \{(1,0,0), (0,1,1), (0,0,1)\}$. Find $L(S)$ and express $(2,3,4)$ as a linear combination of elements of S .
- iv. Prove that the set $\{v\}$ in vector space V over \mathbb{R} is linearly independent for $v \neq 0$ and linearly dependent for $v = 0$.

Q.4 a) Attempt any ONE question from the following: (08)

- i. Define image of a linear transformation. Let V and W be vector spaces over \mathbb{R} . Let $T: V \rightarrow W$ be a linear transformation. Prove that image of T is a vector subspace of W over \mathbb{R} .
- ii. Prove that every maximal linearly independent subset of a finitely generated vector space is a basis of the vector space.

- b) Attempt any TWO questions from the following: (12)
- i. Give one example each of a vector subspace of the vector space \mathbb{R}^3 over \mathbb{R} with dimensions 0, 1, 2 and 3. Write a basis for each vector subspace.
 - ii. Why is $T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined as $T(x, y) = (x - y, |x|)$ not a linear transformation?
 - iii. Check whether $\{(1,0), (1,1), (-1,2)\}$ is a basis of the vector space \mathbb{R}^2 over \mathbb{R} .
 - iv. Find the dimension of $W_1 + W_2$ where $W_1 = \{(0,0)\}$, $W_2 = \mathbb{R}^2$.

Q.5 Attempt any FOUR questions from the following: (20)

- a) Show that $A^2 = A$ for $A = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$.
- b) Define identity matrix, symmetric matrix, skew symmetric matrix, with an example.
- c) Check whether the set $\{(1,1,0), (0,2,1), (0,1,2)\}$ is linearly independent in \mathbb{R}^3 .
- d) Show that the set $\{(1,1), (-1,0)\}$ is a generating set of \mathbb{R}^2 over \mathbb{R} .
- e) Obtain two different bases of \mathbb{R}^3 such that both contain $(1, -2, 0)$.
- f) Let $W_1 = \{(x, y, z) \in \mathbb{R}^3 \mid z = x + y\}$ and $W_2 = \{(x, y, z) \in \mathbb{R}^3 \mid x = y\}$ be vector subspaces of \mathbb{R}^3 . Find the basis and dimension of $W_1 \cap W_2$.

13/04/2018

Q.P. Code :03726

[Time: Three Hours]

[Marks:100]

Please check whether you have got the right question paper.

- N.B:
- All questions are compulsory.
 - Answers to the same questions must be written together.
 - Figures to the right indicate full marks.
 - The use of log table/non - programmable calculator is allowed.

.1 A Select the correct option (MCQ) and complete the following sentences.

12

- The van - der Waal's constant----- is introduced to account for intermolecular forces.
 - 'b'
 - 'z'
 - 'a'
- Inversion temperature can be expressed as -----
 - $T_i = 2a/RT$;
 - $T_i = 2a/Rb$;
 - $T_i = a/2Rb$
- For the reaction, $C_2H_4(g) + H_2(g) \rightleftharpoons C_2H_6(g)$ -----
 - $K_p = K_c$
 - $K_p > K_c$
 - $K_p < K_c$
- At constant temperature and pressure, the criterion for spontaneity is -----
 - $\Delta G = 0$
 - $\Delta G > 0$
 - $\Delta G < 0$
- When ----- gas reacts with lime water, the solution gives white turbidity.
 - NO_2
 - CO_2
 - CO
- Samples required for micro qualitative analysis is about -----
 - $20cm^3$
 - $10cm^3$
 - $1.0cm^3$
- Among NH_3 , H_2O and HF , ----- is the strongest base.
 - H_2O
 - NH_3
 - HF
- Color of phenolphthalein in an alkaline solution is -----
 - Pink
 - Blue
 - Yellow
- Reaction of methyl iodide with sodium metal gives -----
 - Methane
 - Ethane
 - Propane

[P.T.O]

x) Among the following compounds, ----- can give elimination reaction.

- Only ethyl chloride
- Only tertiary butyl bromide
- Both a and b

xi) Reaction intermediate in E1c reaction is-----.

- Carbanion
- Free radical
- Carbocation.

xii) Among the following ----- is the most acidic in character.

- Propene
- Propyne
- Propane

B State whether the following statements are True or false.

- The free path is the distance travelled by the molecule before collision.
- Friedel Crafts acylation is an important method for the preparation of alcohols.
- Alkyne gives elimination reaction.

C Match the following columns:

	Column P		Column Q	
i.	Average mean velocity	m	v^{5+}	
ii.	Gibbs free energy	n	Mn^{2+}	
iii.	DMG paper	o	H^+	
iv.	8 - hydroxy quinoline paper	p	OsO_4	
v.	Alkene hydroxylation	q	H_2O_2	
		r	$\sqrt{\frac{8RT}{\pi M}}$	
		s	$G=H - TS$	

2

i Explain the causes of the deviation of gas laws from its ideal behavior.

ii State : Boyle's law, Charle's law and Avogadro's law.

OR

i State and explain Joule - Thomson's effect.

ii Explain the term compressibility factor.

i. Why was the need of second law of thermodynamics? State the second law of thermodynamics in different ways.

ii. Calculate the standard free energy change associated with a chemical reaction whose equilibrium constant is 0.025 at 295 K. ($R = 8.314 JK^{-1} mol^{-1}$)

OR

i. State Le chatelier principle. How does it explain the effect of temperature and pressure on the state of equilibrium?

ii. Calculate the value of equilibrium constant for reaction at 1000K. The standard free energy change at the same temperature is $-8.75 kJ mol^{-1}$. ($R = 8.314 JK^{-1} mol^{-1}$)

[P.T.O]

C Calculate by using Vander Waal's equation, the temperature at which 4 mol of SO_2 will have a volume of 10dm^3 at a pressure of $2.027 \times 10^6 \text{Nm}^{-2}$. 04
 (Given $a = 0.68 \text{Nm}^4 \text{mol}^{-2}$; $b = 5.64 \times 10^{-5} \text{m}^3 \text{mol}^{-1}$; $R = 8.314 \text{NmK}^{-1} \text{mol}^{-1}$)

OR

C I. Define : a) chemical equilibrium b) Isoentropic change 04
 II. Distinguish between reversible and irreversible reactions.

.3 i Explain diverse ion effect. 05
 A ii Explain the importance of solubility product. 03

OR

i On the basis of weight of the sample for analysis explain the types of qualitative analysis. 05
 ii The solubility product of BaSO_4 is 1×10^{-10} at 25°C . Calculate its solubility in pure water at the same temperature. 03

i Explain the terms acid and base on the basis of 'Solvent System Concept'. Discuss the auto-ionization of liquid ammonia using the same. 05
 ii Write a brief note on class 'a' metals giving suitable examples. 03

OR

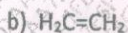
i What is Pearson's principle of acids and bases? How is it used to explain:
 a) Metal poisoning b) Stability of complexes 05
 ii Give an account of applications of acid base concept on the basis of Arrhenius theory. 03

Explain the separation of Cu^{2+} and Fe^{3+} by using complexation phenomenon. 04

OR

Explain the factors affecting the strength of Lewis acids. 04

4 i Write the products of ozonolysis of the following: 05



ii Explain peroxide effect with a suitable example. 03

OR

i Discuss hydroboration oxidation reaction with suitable examples. 05
 ii How is propene converted to a) propane b) 2-Bromo propane 03

i Explain E_1 reaction and its mechanism with an example. 05
 ii Explain Saytzeff rule with the help of suitable example. 03

OR

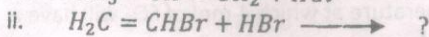
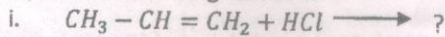
i Discuss $[4\pi + 2\pi]$ cyclo addition reaction with suitable examples. 05
 ii What is Wurtz reaction? Give two suitable examples. 03

[P.T.O]

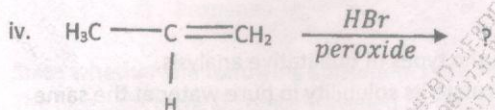
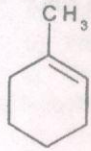
Give the mechanism of chlorination of propane.

OR

Complete the following reactions:



iii.



04

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Please check whether you have got the right question paper.

- N.B: i) All questions are compulsory
ii) Answer to the same questions must be written together
iii) Figures to the right indicate full marks
iv) The use of log tables/non-programmable calculator is allowed

2.1 A) Select the correct option and complete the following sentences:

12

i) pH range of phenolphthalein indicator is _____.

- a) 5.0 - 8.0
b) 8.3 - 10.0
c) 2.8 - 4.6

ii) The concentration of H^+ ions in a pure water at 298 K is _____.

- a) $1 \times 10^{-14} M$
b) $1 \times 10^{-7} M$
c) $1 \times 10^7 M$

iii) In the visible light _____ color has the longest wavelength.

- a) Red
b) Yellow
c) Violet

iv) Tetragonal crystal system has the _____ unit cell dimensions.

- a) $a = b = c$ and $\alpha = \beta = \gamma = 90^\circ$
b) $a = b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$
c) $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$

v) The number of lone pairs of electrons present in SO_2 molecule is _____.

- a) 1
b) 3
c) 2

vi) Number of electrons in valence shell of B in BCl_3 is _____.

- a) 2
b) 1
c) 3

vii) I_2 is insoluble in water, the solution of iodine is prepared by using _____ reagent.

- a) NH_4I
b) KIO_3
c) KI

- viii) A graphical plot of the volt equivalents vs oxidation state of chemical species is called _____.
- Frost diagram
 - Latimer diagram
 - Walsh diagram
- ix) When molecule experiences strain the internal energy _____.
- decreases
 - increases
 - equalizes
- x) In chlorobenzene, chlorine exhibits _____ effect.
- Only +R effect
 - Only -I effect
 - Both +R and -I effect
- xi) _____ has the highest stability among the following alicyclic compounds.
- Cyclobutane
 - Cyclohexane
 - Cyclooctane
- xii) Oleum is _____.
- SO_3 in H_2SO_4
 - SO_3 in pyridine
 - $ClSO_3H$ in CCl_4

B) State whether the following statements are true or false:

- As the temperature increases, the degree of ionization of an electrolyte decreases.
- In iodometry, liberated iodine is titrated with standard solution of thiosulphate.
- Boat form of cyclohexane has transannular strain.

03

C) Match the following columns:

05

Column A	Column B
i) Strong electrolyte	a) X-rays
ii) Study of crystal structure is done by	b) Minimum torsional strain
iii) Oxidation-reduction reaction	c) 120°
iv) Bond angle in trigonal planar geometry	d) $HClO_4$
v) Staggered form	e) rusting of iron
	f) 180°
	g) UV-rays
	h) HCN

2. A)

- The ionization constant of acetic acid is 1.74×10^{-5} . Calculate the degree of dissociation of acetic acid in $0.05M$ solution. Calculate the concentration of acetate ions in the solution and its pH.
- Explain the concept of 'ionic product' of water.

03

OR

- A)
- What is acid ionization constant? Derive an expression for K_a of a weak acid (HA) in terms of α and C . 05
 - Calculate the pH of the solution obtained by mixing 200 cm^3 of 0.1 M NaOH and 300 cm^3 of 0.2 M KOH ? 03

- B)
- Wireless networking standard channels work between $2.4 \times 10^9 \text{ Hz}$ and $5.0 \times 10^9 \text{ Hz}$ range of frequency bands. What wavelengths correspond to these frequencies? ($C = 3 \times 10^8 \text{ m/s}$, $h = 6.626 \times 10^{-34} \text{ JS}$) 05
 - Discuss the characteristics of crystalline solids. 03

OR

- B)
- State the law of symmetry. 02
 - How many elements of symmetry are there in cubic crystal. Elaborate in detail. 03
 - A band spectrum is observed for electronic transition of molecules but a line spectrum is observed for atoms – Explain. 03

- C)
- Define:-
 - Buffer capacity. 02
 - Diprotic acid. 02
 - List the regions of electromagnetic spectrum in order of increasing frequency. 02
 - Define Crystal lattice. 02

OR

- C)
- Define:-
 - Triprotic acid. 02
 - Buffer action. 02
 - Define :-
 - Unit cell. 02
 - Frequency. 02
- 3 A)
- Explain isoelectronic principle with suitable examples. 04
 - Define polarization of an atom. Explain any two factors which favours the covalent character of ionic bond. 04

OR

A)

- i) Draw lewis dot structure of the following molecular ions. 04
 a) NO_2^-
 b) NH_4^+
- ii) Explain the application of VSEPR theory for predicting the shape and F-Br-F bond angles in BrF_5 (atomic number of Br=35). 04

B)

- i) Balances the following equation with step wise explanation. 04
 $CrO_4^{2-} + SO_3^{2-} \rightarrow Cr(OH)_4^- + SO_4^{2-}$ (Basic medium)
- ii) The standard electrode potential value of silver are as given in the table below. 04

Redox reaction	E° value
$Ag^{2+} + e^- \rightarrow Ag^+$	+1.99V
$Ag^+ + e^- \rightarrow Ag_{(s)}$	+0.80V
$Ag^{2+} + 2e^- \rightarrow Ag_{(s)}$	$E_3^0 = ?$

Construct Latimer potential diagram. Calculate E_3^0 & ΔG° value for the reaction
 $Ag^{2+} + 2e^- \rightarrow Ag_{(s)}$

OR

B)

- i) Calculate the E_{sys} for the titration of 10-cm^3 of $0.1M Fe^{+2}$ versus $0.02M KMnO_4$ on addition of 04
 a) 5.0 cm^3
 b) 10.0 cm^3
 c) 10.1 cm^3 of $0.02M KMnO_4$ in solution of pH=1
 d) [$E_{Fe^{3+}/Fe^{2+}}^0 = 0.771V$ and $E_{MnO_4^-/Mn^{2+}}^0 = 1.51V$]
- ii) Explain the significance of water as a reducing agent and oxidising agent. 04

C) Differentiate between electrovalent bond and covalent bond. 04

OR

C) What are disproportionation reactions? Explain the disproportionation reaction of Cu^{+1} to Cu^{+2} and Cu^0 . 4

A)

- i) Explain the mechanism of Bromination of benzene. 05
 ii) What is Huckel's rule? Draw resonating structures of anthracene. 03

OR

A)

- i) Write a note on conformational analysis of cyclohexane. 05
 ii) Explain Hammonds postulate. 03

B) i) Explain directing influence of -OH group on electrophilic aromatic substitution in phenol. 05

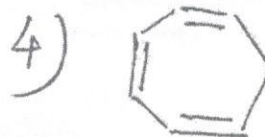
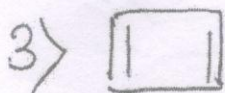
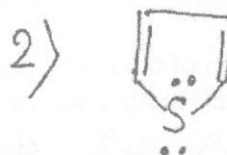
ii) What is antiaromaticity? Give example of antiaromatic compounds. 03

OR

B) i) How is benzene converted to nitrobenzene? Explain its mechanism. 05

ii) State any three criteria which must be satisfied for the compound to be aromatic. 03

C) State which of the following is aromatic/antiaromatic/ non aromatic. 04



OR

C) Explain stability of cyclopropane and cyclopentane on the basis of angle strain theory. 04

Q.5 Attempt any four of the following:

A) Derive Henderson's equation for the pOH of basic buffer. 05

B) i) What is spectroscopy? How are its techniques an important tool for chemist? 03

ii) Why is amorphous solid called as 'super cooled liquids' 02

C) What is meant by steric number? Predict the shape of NH₃ molecule on the basis of steric number. 05

D) Find out oxidation number of Mn in the following: 05

i) MnO_4^-

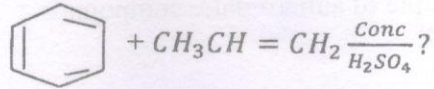
ii) K_2MnO_4

iii) MnO_2

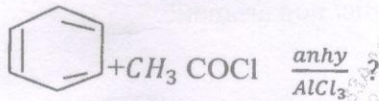
iv) $Mn(OH)_2$

v) Mn_2O_3

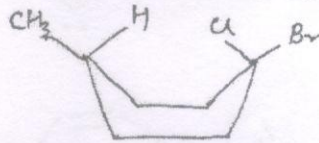
- E) i) Explain flipping in cyclohexane. 02
 ii) Complete the following reaction and name the product formed.



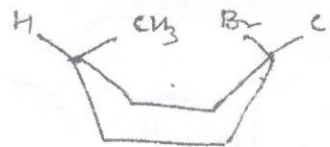
- F) i) Complete the following reaction, name the reaction and the product formed. 03



- ii) Which of the following
 a) has methyl and Br groups at the flagpole position 02



(1)



(2)

- b) is meta directing group
 $-\text{NO}_2, -\text{NH}_2, -\text{Cl}$

RyBse - Semester-II
Zoology - Paper-I
16/04/2018

Q.P. Code :12101

[Time: Three Hours]

[Marks:100]

Please check whether you have got the right question paper.

- N.B:
1. All question are compulsory.
 2. Figures to the right indicate full marks.
 3. Draw neat and labelled diagrams wherever necessary.

Q.1 A) Fill in the blanks by choosing the correct option given in the bracket.

05

- a) _____ is defined as the number of new individual added to a population.
(Natality, Mortality, Birth rate)
- b) _____ migrate from ocean to the estuaries. (Eel, Trouts, Tiger prawn)
- c) Light penetrates to the bottom of _____ zone. (littoral, limnetic, profounder)
- d) Pangolin is categorized as _____ species. (Vulnerable, extinct, endangered)
- e) _____ is a home to the largest population of lion tailed macaques.
(Sivent valley, Bandipur sanctuary, pirotan island)

B) Match the column I and II and rewrite:-

05

- | I | II |
|----------------------|-----------------------------|
| a) Cancave curve | i. Plasmodium |
| b) Endo parasite | ii. Olive Ridley sea Turtle |
| c) Abiotic component | iii. Coral reef |
| d) Pirotan Island | iv. Light |
| e) Vulnerable | v. Oyster |

C) State whether True or False:-

05

- a) The concept of life table was first formulated by Raymond pearl.
- b) Obligate parasites are also called as holoparasite.
- c) Sulphur cycle is a sedimentary cycle.
- d) Keoladeo Ghana National park is a manmade wetland park of India.
- e) Corridors are inherent geographical linkages.

D) Answer in One sentence only

05

- a) What is Ecological density?
- b) Define food chain.
- c) What is Nitrification?
- d) Give full form of UNDP.
- e) Name two representative animal species of Gir National Park.

TURN OVER

Q.2 A) With suitable example explain the types of growth patterns.

10

OR

A) Define population density. Explain various methods used for measurement of population density.

B) Write short notes on any two.

10

- a) Fecundity
- b) Ecological niche
- c) Sigmoid Growth Pattern
- d) Mortality

Q.3 A) What are ecological pyramids? Add a note on its types.

10

OR

A) What are biochemical cycles? Explain sulphur cycle.

B) Write short note on any two.

10

- a) Positive interactions
- b) Food web
- c) Biotic components of an Ecosystem
- d) Detritus food chain

Q.4 Answer any two of the following.

20

- a) Explain the concept of threatened species with suitable examples from India.
- b) Explain biopiracy in India with suitable example.
- c) Describe Jim Corbett National Park.
- d) Explain principle and benefits of Ecotourism.

Q.5 Write short notes on any four.

20

- a) Census
- b) Uses of life table
- c) Parasites
- d) Lotic system
- e) Asiatic lion
- f) Project Rhinoceros

B.Y.B.Sc - Semester - II
Zoology - Paper - I
17/04/2018

Q.P. Code :02812

[Time: Three Hours]

[Marks:100]

Please check whether you have got the right question paper.

- N.B:
1. All questions are **compulsory**.
 2. All questions Carry **equal marks**.
 3. Draw neat and labelled diagrams wherever necessary.

Q.1 A) Fill in the blanks by choosing the correct option given in the bracket.

05

- a) _____ migrates from ocean to the eustaries for breeding.
[Sharks, Pomfret, Tiger prawns]
- b) The concept of the life table was first formulated by _____.
[Raymond Pearl, Charles Elton, Thomas Malthus]
- c) Interaction between the members belonging to the same species is termed as _____.
[animal interaction, intra specific interaction, inter specific interaction]
- d) The temperature range at which organisms carry out normal activities is known as _____.
[euphotic zone, biotic zone, biokinetic zone]
- e) Pangolin is categorized as _____ species
[vulnerable, endangered, extinct]

B) Match the columns I and II and rewrite.

05

- | I | II |
|------------------------|----------------------------------|
| a) Concave shape curve | i) <i>Panther Pardus</i> |
| b) Phytoplankton | ii) <i>Panther Leopercica</i> |
| c) Commensalism | iii) Inverted Pyramid of biomass |
| d) Asiatic lion | iv) Mortality is very high |
| e) Leopard | v) Remora-Shark |

C) State whether True or False:-

05

- a) Fecundity is the egg laying capacity of a female.
- b) Oxygen cycle is a Hydrologic type of cycle.
- c) Predation is a negative interaction.
- d) Keoldeo National Park is located in Bharatpur.
- e) Project Crocodile was launched in 1975 by Government of India.

P.T.O

D) Answer the following in **one** sentence:

- What is Life table?
- Give any two survivorship curves.
- Give full form of IUCN.
- Define bio piracy.
- What is project Rhinoceros?

Q.2 A) With suitable example explain the concept of mortality and its type.

OR

A) Define population dispersal. Give an account of population distribution patterns.

10

10

Q.2 B) Answer the following. (any two)

- Explain mechanism and significance of human census.
- Give an account of Niche Concept.
- Explain age structure. Add a note on age pyramid.
- Explain J shaped Growth Curve.

10

Q.3 A) What is a food chain? Describe different types of food chains with suitable examples.

OR

A) Describe any one fresh water habitat in detail.

10

10

Q.3 B) Answer the following. (any two)

- Explain the influence of temperature on biota.
- Classify and describe with examples, animals based on mode of obtaining food.
- What is positive interaction? Explain different types with suitable example
- Discuss the flow of energy through the ecosystem.

10

Q.4 Answer the following. (any two)

- Describe kaas plateau as 'Maharashtra's valley of flowers'.
- Explain Basmati Rice, Haldi and Neem plant Patents.
- Describe Gir National Park with two representative animal species.
- Explain biopiracy in India with suitable example.

20

Q.5 Write short notes on. (any four)

- Sex ratio
- Fecundity
- Abiotic factors
- Silent valley national park
- Wildlife protection Act 1972
- Pyramid of Biomass.

20

Q.P. Code : 33455

[Time: Three Hours]

[Marks: 100]

Please check whether you have got the right question paper.

- N.B:
1. All questions are compulsory.
 2. All questions carry equal marks
 3. Draw neat labelled diagrams wherever necessary.

Q1. A) Fill in the blanks by choosing the correct option given in the bracket

- a. _____ is the most extreme form of malnutrition
(obesity, flatulence, starvation)
- b. Major site for storage of fat is in the _____ layer of skin.
(epidermal, dermal, subcutaneous)
- c. Potassium permanganate is a strong _____ agent.
(oxidizing, reducing, disinfecting)
- d. Oral hygiene is the practice of keeping the _____ clean.
(body, mouth, hands)
- e. _____ is a sleep disorder.
(Diabetes, Migrane, Insomnia)

05

B) Match the Columns I and II and rewrite

- | I | II |
|------------------|--------------------------------|
| a) Goitre | 1) Syphilis |
| b) Mobile phones | 2) Retro virus |
| c) Rabies | 3) Electro magnetic radiations |
| d) AIDS | 4) Thyroid gland |
| e) Penicillin | 5) Dog bite |

05

C) State whether True or False

- a. IgD is present in large amounts in colostrum.
- b. Influenza virus are small RNA viruses.
- c. Leprosy is not an infectious disease.
- d. Blood pressure lowers during sleep.
- e. HIV virus severely weakens the immune system.

05

D) Answer in one sentence

- a. Define balanced diet.
- b. Give full form of MLEC.
- c. Define non potable water.
- d. Give any two causes of Insomnia.
- e. Give any two types of Asthma.

05

Turn Over

Q.2 A) Describe causes, symptoms, prevention and remedy for Anemia. 10

OR

A) What is protein energy malnutrition? Elaborate upon its types.

B) Answer the following (any two) 10

- a. Causes and remedy for piles.
- b. Significance of breast feeding.
- c. Rickets.
- d. Peptic ulcer.

Q.3 A) Define health. Add a note on factors that influence health. 10

OR

A) Describe method of purification of water for small scale consumption.

B) Answer the following (any two) 10

- a. Radiation risk from electronic gadgets.
- b. Concept of blood bank.
- c. Personal hygiene.
- d. Properties of water.

Q.4 Give a detailed account of symptoms, causes, prevention and remedy of the following diseases (any two) 20

- a. Insomnia
- b. Tuberculosis
- c. Hypertension
- d. Gonorrhoea

Q.5 Write short notes on (any four) 20

- a. BMI and its significance
- b. Goitre
- c. Social health
- d. World health organization
- e. Depression
- f. Oral cancer

B.Sc - Semester II
Zoology Paper II

20/04/2018

Q.P. Code : 33454

[Time: Three Hours]

[Marks: 100]

Please check whether you have got the right question paper.

- N.B:
1. All questions are compulsory.
 2. All questions carry equal marks
 3. Draw neat labelled diagrams wherever necessary.

Q1. A) Fill in the blanks by choosing the correct option given in the bracket

- a. Peptic ulcer is a general term for ulcers in _____.
(stomach, mouth, liver)
- b. BMI is the simplest method of assessment of _____.
(starvation, flatulence, obesity)
- c. Poliomyelitis is caused by _____.
(RNA virus, Bacteria, DNA virus)
- d. Iodine is an excellent _____ agent.
(oxidizing, reducing, disinfecting)
- e. Syphilis is a _____ disease.
(contagious, viral, non contagious)

05

B) Match the Columns I and II and rewrite

- | | |
|------------------|---------------------|
| I | II |
| a) Dengue fever | 1) Bacteria |
| b) Small pox | 2) Aspirin |
| c) Plasma | 3) Mosquitoes |
| d) Typhoid | 4) Blood derivative |
| e) Pain reliever | 5) Variola virus |

05

C) State whether True or False

- a. Swine flu causes a respiratory infection.
- b. The most common symptom of peptic ulcer is belching.
- c. Springs are man made water resources.
- d. HIV spreads through mother's milk.
- e. Relaxation therapy cannot be used to treat anxiety.

05

D) Define the following

- a. Anemia
- b. Optimum nutrition
- c. Blue water footprint
- d. Tetanus
- e. Specific host

05

Turn Over

Q.2 A) Discuss causes and consequences of obesity. 10

OR

A) Explain in detail the causes, symptoms and remedy for flatulence.

B) Explain the following (any two) 10

- a. Importance of dietary fibers.
- b. Symptoms and prevention of acid reflux.
- c. Causes and symptoms of constipation.
- d. Causes and symptoms of Rickets.

Q.3 A) Describe sources of water. 10

OR

A) Explain dog bite. Add a note on its treatment.

B) Write short notes on (any two) 10

- a. Physical and psychological health.
- b. Chemical disinfection.
- c. First Aid.
- d. National Malaria Eradication Programme

Q.4 Answer the following (any two) 20

- a. Explain causes, symptoms and treatment of migraine.
- b. Describe causes, symptoms, diagnosis and treatment of Insomnia.
- c. Discuss causes, symptoms, diagnosis and precautions of AIDS.
- d. Give an account of causative agent, mode of transmission, treatment and prevention of Typhoid.

Q.5 Write short notes on (any four) 20

- a. Sex hygiene
- b. Goitre
- c. Starvation
- d. Effects of Self medication
- e. Hypertension
- f. Communicable diseases

Fy Bk - Semester II

Botany - Paper - I

16/04/2018

Q.P. Code :32378

[Time: Three Hours]

[Marks:100]

Please check whether you have got the right question paper.

N.B:1. All questions are compulsory.

2. Figures to the right indicate full marks.

3. Draw neat and labelled diagrams wherever necessary.

Q.1 A) Choose the correct option from the following:

10

- a. _____ is the most primitive type of protosteles.
i) Haplostele ii) Siphonosteles iii) Atactosteles iv) Solenosteles
- b. In pteridophytes sex organs are _____ jacketed.
i) Unicellular ii) Bicellular iii) Exposed iv) Multicellular
- c. _____ are also known as chalk glands.
i) Hydathodes ii) Ramentum iii) Stomata iv) Trichomes
- d. In *Cycas* female cones are _____
i) Present at the apex ii) Present in the axil of leaf
iii) Present beside male cone iv) Absent
- e. *Cycas* shows _____ type of pollination.
i) Entomophilous ii) Myrmecophilous iii) Hydrophilous iv) Anemophilous
- f. *Cycas* is called _____
i) Sago palm ii) Date palm iii) Areca palm iv) Fan palm
- g. _____ tissue replaces lateral veins in *Cycas* leaf to check the loss of water as dew.
i) Vascular ii) Epidermal iii) Transfusion iv) Ground
- h. The lateral outgrowth present at the base of the leaf is called _____.
i) Petiole ii) Blade iii) Stipules iv) Pulvinus
- i. Sunflower shows _____ type of inflorescence.
i) Spike ii) Catkin iii) Capitulum iv) Spadix
- j. In *Nepenthes* plant, the leaf blade is modified into a _____.
i) Bladder ii) Pitcher iii) Tendril iv) Phyllode

Q.P. Code :32378

- Q.1 B) Answer the following in **one sentence**: 10
- Mention the position of sori in *Nephrolepis* pinna.
 - Define actactostele.
 - What is monoxyle wood?
 - What is significance of phyllotaxy?
 - Give names of two racemose inflorescence.
- Q.2 Answer **any two** from the following: 20
- Describe the different types of advanced stele.
 - Explain with the help of suitable diagram, the internal structure of *Nephrolepis* rachis.
 - Describe the structure of prothallus and sex organs in *Nephrolepis*.
 - Explain alternation of generations in *Nephrolepis*.
- Q.3 Answer **any two** from the following: 20
- Write a detailed note on microsporophyll of *Cycas*.
 - Explain with the help of a diagram, T.S. of pinna in *Cycas*.
 - Give a detailed account of pollination and fertilization process in *Cycas*.
 - Give the economic importance of gymnosperms in detail.
- Q.4 Answer **any two** from the following: 20
- Give the classification, distinguishing characters, floral formula and two plants of economic importance of family Malvaceae.
 - Explain cymose type of inflorescence with examples.
 - What is pinnately compound leaf? Describe types of pinnately compound leaves.
 - Give an account of various leaf modifications.
- Q.5 Write short notes on **(any four)**: 20
- Systematic position of *Nephrolepis* with reasons.
 - Hydathode of *Nephrolepis*.
 - Draw L.S. of *Cycas* ovule.
 - Whorled phyllotaxy.
 - Parts of a typical leaf.
 - Coralloid roots.

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FyBse - Semester - II
Botany - Paper - II

19/04/2018

Q.P. Code :32382

[Time: Three Hours]

[Marks: 100]

Please check whether you have got the right question paper.

- N.B: i) All questions are compulsory
ii) Figures to the right indicate full marks
iii) Draw neat and labeled diagrams whenever necessary

- Q.1 A. Choose the correct option from the following: 10
- a) _____ is the essential pigment for photosynthesis
i) Anthocyanin ii) Carotene iii) Chlorophyll iv) Xanthophyll
- b) Photosystem I consists of _____
i) P₆₈₀ ii) P₆₀₀ iii) P₇₀₀ iv) P₆₉₆
- c) _____ is the first stable compound formed during Calvin cycle.
i) ATP ii) PGA iii) RuBP iv) NADPH
- d) RuBP is a _____ compound.
i) 3 Carbon ii) 5 Carbon iii) 9 Carbon iv) 2 Carbon
- e) _____ is a primary metabolite.
i) Alkaloids ii) Antibiotics iii) Starch iv) Glycoside
- f) Eugenol is obtained from _____
i) Adulsa ii) Tulsi iii) Haldi iv) Aloe
- g) Turmeric powder is prepared from _____ of *Curcuma longa*.
i) Stem ii) Leaf iii) Rhizome iv) Bark
- h) Companion cells are components of _____
i) Cambium ii) Xylem iii) Phloem iv) Parenchyma
- i) _____ are unicellular structures present on epidermis.
i) Glandular hairs ii) Scales iii) Ramentum iv) Dendroid hairs
- j) Conjoint, collateral, open and endarch vascular bundles are found in _____
i) Monocot stem ii) Dicot stem iii) Dicot root iv) Monocot root

Q.P. Code :32382

Q 1. B. Answer the following in **one sentence**:

- Write any two functions of parenchyma tissue.
- What is protoxylem?
- Significance of Hill's reaction.
- Write any two active constituents of *Zingiber officinale*.
- Name any two alkaloids found in plants.

10

Q.2 Answer **any two** from the following:

- Describe T.S. of young Dicot stem.
- Give a detailed account of epidermal appendages of plants.
- Enlist and explain different components of phloem tissue.
- Mention the types and describe structure and functions of parenchyma tissue.

20

Q.3 Answer **any two** from the following:

- Discuss Non-cyclic photophosphorylation.
- Explain Calvin pathway in C_3 plants.
- Elaborate the role of plant pigments involved in photosynthesis.
- Describe in detail the C_4 pathway.

20

Q.4 Answer **any two** from the following:

- What are secondary metabolites? Give types and functions of secondary metabolites?
- What are the contents of Grandma's pouch? Give botanical name, family, active constituents, source and uses of Tulsi.
- Give an account on botanical name, family, active constituents and uses of Sandalwood and *Aloe*
- What is medicinal botany? Describe primary metabolites and mention their functions.

20

Q.5 Write short notes on **(any four)**:

- T.S of monocot leaf.
- Schematic representation of CAM pathway.
- Active constituents of Turmeric.
- Medicinal uses of ginger.
- Cyclic photophosphorylation.
- Structure of Vascular bundles in monocot stem.

20

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