

Total No. of Questions : 4]

SEAT No. :

PD1527

[Total No. of Pages : 2

[6467]-401
S.Y.B.Sc. (Regular)
MATHEMATICS
MT-241: Linear Algebra
(2019 CBCS Pattern) (Semester - IV) (24111)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicates full marks.*

Q1) Attempt any FIVE of the following. [5]

- a) Find rank of matrix A, where $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \end{bmatrix}$
- b) Define Homogeneous Linear System.
- c) Write down the standard basis for $\mathbb{R}^3$.
- d) Check whether the set $W = \{(x, y) \in \mathbb{R}^2 \mid x + y = 5\}$ is a subspace of $\mathbb{R}^2$.
- e) If A is a 4×5 matrix and $\text{rank}(A) = 2$ then find nullity (A).
- f) Define Linear transformation.
- g) Find the reflection of (10, 20) about the x - axis.

Q2) a) Attempt any ONE of the following. [5]

- i) Let $s = \{u_1, u_2, \dots, u_r\}$ be a set of vectors in $\mathbb{R}^n$. If $r > n$, then show that s is linearly dependent.
- ii) A non-empty subset W of a vector space V is a subspace of V if and only if $\alpha w_1 + \beta w_2 \in W, \forall \alpha, \beta \in k, w_1, w_2 \in W$.

b) Attempt any ONE of the following. [5]

- i) Apply Gauss - Jordan method to solve the system of equations
$$\begin{aligned} x + y + z &= 9 \\ 2x - 3y + 4z &= 13 \\ 3x + 4y + 5z &= 40 \end{aligned}$$
- ii) Apply Gaussian Elimination method to solve the following system of equations.
$$\begin{aligned} x + 5y + 4z - 13w &= 3 \\ 3x - y + 2z + 5w &= 2 \\ 2x + 2y + 3z - 4w &= 1 \end{aligned}$$

P.T.O.

Q3) a) Attempt any ONE of the following. [5]

- i) If $W \subseteq V$ is a vector subspace of a finite dimensional vector space V then show that $\dim(W) \leq \dim(V)$. Moreover, $\dim(W) = \dim(V)$ if and only if $W = V$.
- ii) Let V be a n - dimensional vector space ($n \geq 1$). Then show that any subset of V with n elements which spans V is a basis.

b) Attempt any ONE of the following. [5]

- i) Let $W = \{(x, y, z) \in \mathbb{R}^3 \mid x^2 - y^2 = 0\}$ be a subset of $\mathbb{R}^3$. Show that W is not a subspace of $\mathbb{R}^3$.
- ii) Show that the set $s = \{(3, 0, -6), (-4, 1, 7), (-2, 1, 5)\}$ is a basis for $\mathbb{R}^3$.

Q4) a) Attempt any ONE of the following. [5]

- i) If $T: V \rightarrow W$ is a linear transformation then show that
(A) $T(0) = 0$. (B) $T(-u) = -T(u)$, for all u in V .
(C) $T(u - v) = T(u) - T(v)$, for all u and v in V .
- ii) Show that a linear transformation $T: V \rightarrow W$ is injective if and only if $\ker(T) = \{0\}$.

b) Attempt any ONE of the following. [5]

- i) Determine whether the function $T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined as $T(x, y) = (x + 1, y)$ is linear.
- ii) Let $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ be a linear transformation such that $T(1, 0, 0) = (2, 4, -1)$, $T(0, 1, 0) = (1, 3, -2)$ and $T(0, 0, 1) = (0, -2, 2)$. Compute $T(-2, 4, -1)$.



Total No. of Questions : 4]

SEAT No. :

PD-1528

[Total No. of Pages : 3

[6467] - 402
S.Y. B.Sc.
MATHEMATICS
MT-242 (A): Vector Calculus
(2019 Pattern) (CBCS) (Semester - IV) (24112A)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Attempt any five of the following :

[5]

- a) If $\vec{f}(t) = (t^2 - 1)\vec{i} + (3t + 1)\vec{j} + 2t^2\vec{k}$ then find $\lim_{t \rightarrow 2} \vec{f}(t)$.
- b) Evaluate $\int_1^4 \left(\frac{1}{t} \vec{i} - \vec{j}\right) dt$.
- c) Find a potential function f for the field $\vec{F} = 2x\vec{i} + y\vec{j}$
- d) Find $\vec{K}$ – component of $\text{curl } \vec{F}$ for the vector field $\vec{F} = (x^2 - y)\vec{i} + y^2\vec{j}$ on the plane.
- e) Define Solenoidal vector field.
- f) Find parametric representation of the cylinder $x^2 + y^2 = 5, -1 \leq Z \leq 6$.
- g) State Stoke's theorem.

P.T.O.

Q2) a) Attempt any one of the following : [5]

- i) If $\vec{r}(t)$ is a differentiable vector function of t and the length of $\vec{r}(t)$ is constant then prove that $\vec{r} \cdot \frac{d\vec{r}}{dt} = 0$
- ii) If $\vec{F}$ is a vector field and C is any closed curve in a region D then prove that the field $\vec{F}$ is conservative if and only if $\oint_C \vec{F} \cdot d\vec{r} = 0$

b) Attempt any one of the following : [5]

- i) Find the line integral of $f(x,y,z) = x+y+z$ over the straight line segment from the point $(1,2,3)$ to $(0,-1,1)$.
- ii) Find the arc length along the curve $\vec{r}(t) = 6\sin 2t \vec{i} + 6\cos 2t \vec{j} + 5t \vec{k}$ from $t = 0$ to $t = \pi$

Q3) a) Attempt any one of the following : [5]

- i) If $\vec{u}(t)$ and $\vec{v}(t)$ are differentiable vector functions of t then prove that, $\frac{d}{dt}[\vec{u}(t) \cdot \vec{v}(t)] = \vec{u}(t) \cdot \frac{d}{dt} \vec{v}(t) + \frac{d}{dt} \vec{u}(t) \cdot \vec{v}(t)$.
- ii) Let C be a smooth curve joining the point A to point B in the plane and is parametrized by $\vec{r}(t)$. Let f be a differentiable function with a continuous gradient vector $\vec{F} = \nabla f$ on a domain D containing C then prove that $\int_C \vec{F} \cdot d\vec{r} = f(B) - f(A)$

b) Attempt any one of the following : [5]

- i) Evaluate $\iint_S y d\sigma$ where S is the portion of the cylinder $x^2 + y^2 = 3$ that lies between $Z=0$ and $Z=6$.
- ii) Use Green's theorem to find counter clockwise circulation for the field $\vec{F} = 3y\vec{i} + 2x\vec{j}$ where C is the boundary of $0 \leq x \leq \pi, 0 \leq y \leq \sin x$.

Q4) a) Attempt any one of the following :

[5]

- i) Define conservative vector field and show that

$$\vec{F} = (x + y - z)\vec{i} + (2x - y + 3z)\vec{j} + (3x + 2y + z)\vec{k}$$

is not conservative.

- ii) Use Stoke's theorem to evaluate $\iint_S \text{curl} \vec{F} \cdot \vec{n} d\sigma$ where

$\vec{F} = xz\vec{i} + yz\vec{j} + xy\vec{k}$ such that S is the part of sphere $x^2 + y^2 + z^2 = 4$ that lies in the cylinder $x^2 + y^2 = 1$ above X – Y plane.

b) Attempt any one of the following :

[5]

- i) Integrate $G(x, y, z) = x^2$ over the cone $Z = \sqrt{x^2 + y^2}, 0 \leq Z \leq 1$.

- ii) Verify divergence theorem for $\vec{F} = x\vec{i} + y\vec{j} + z\vec{k}$ over the sphere $x^2 + y^2 + z^2 = a^2$.



Total No. of Questions : 4]

SEAT No. :

PD1529

[Total No. of Pages : 2

[6467]-403

S.Y.B.Sc. (Regular)

MATHEMATICS

MT-242 (B) : Dynamical Systems

(2019 Pattern) (CBCS) (Semester-IV) (24112 B)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.

Q1) Attempt any five of the following. [5]

- a) Define diagonalizable matrix.
- b) Find the eigen values of a matrix $A = \begin{bmatrix} 2 & -1 \\ 5 & 2 \end{bmatrix}$.
- c) Define equilibrium solution.
- d) Find the $\det(A)$ if the matrix A has its characteristic polynomial $P(\lambda) = \lambda^3 - 2\lambda^2 + \lambda + 5$.
- e) Define phase line of a differential equation.
- f) State whether the system $X' = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix} X$ is source. Justify.
- g) Define phase portrait.

Q2) a) Attempt any one of the following. [5]

- i) Prove that any square matrix A is invertible if and only if $\lambda=0$ is not an eigenvalue of A.

- ii) Find the straight line solution of $X' = \begin{bmatrix} 1 & 3 \\ 1 & -1 \end{bmatrix} X$

b) Attempt any one of the following. [5]

- i) Is the matrix $A = \begin{bmatrix} -1 & 4 & 2 \\ -3 & 4 & 0 \\ -3 & 1 & 3 \end{bmatrix}$ diagonalizable? Justify your answer.

- ii) For $x'(t) = x^4 - x^2$, find the equilibrium point and determine whether they are sink, source or neither, if any.

P.T.O.

Q3) a) Attempt any one of the following. [5]

i) If $\vec{v} \in \mathbb{R}^n$ is an eigen vector of a matrix A associated to eigen value λ then prove that $\vec{v}$ is also an eigen vector of $\exp(A)$ associated to e^λ .

ii) Prove that $\alpha e^{\lambda t} \begin{pmatrix} 1 \\ 0 \end{pmatrix} + \beta e^{\lambda t} \begin{pmatrix} t \\ 1 \end{pmatrix}$ is the general solution of

$$X' = \begin{pmatrix} \lambda & 1 \\ 0 & \lambda \end{pmatrix} X.$$

b) Attempt any one of the following. [5]

i) Find the canonical form of $A = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}$

ii) Find the equilibrium points of the system
 $X' = x + 2y, Y' = 3x + 6y$

Q4) a) Attempt any one of the following. [5]

i) Show that $x^2 - y^2 = 1$ is a solution of the system $X' = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} X$ passing through (1,0).

ii) If $A = \begin{bmatrix} a & \sqrt{2} + \frac{a}{2} \\ \sqrt{2} - \frac{a}{2} & 0 \end{bmatrix}$. Find T, D and show that $D = \frac{T^2}{4} - 2$.

b) Attempt any one of the following. [5]

i) Find the general solution of the harmonic oscillator equation

$$X' = \begin{pmatrix} 1 & 2 \\ 1 & 0 \end{pmatrix} X.$$

ii) Determine whether the planar system $X' = \begin{pmatrix} 1 & 2 \\ 0 & 3 \end{pmatrix} X$ and

$X' = \begin{pmatrix} 1 & 2 \\ 3 & 6 \end{pmatrix} X$ has unique equilibrium point (0, 0) or straight line of equilibrium points.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PD1530

[6467]-404

S.Y.B.Sc. (Regular)

PHYSICS

PHY-241 : Oscillations, Waves and Sound

(2019 Pattern) (CBCS) (Semester-IV) (Paper-I) (24121)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Q.2 to Q.5 carry equal marks.*
- 4) *Use of calculator is allowed.*
- 5) *Figures to the right indicate full marks.*

Q1) Solve any five of the following.

[5]

- a) Define angular simple Harmonic motion.
- b) What is log decrement?
- c) Define quality factor.
- d) What is Blue shift?
- e) The frequency of a damped oscillator of mass 3gm is 10 Hz. If the coefficient of damping is $0.314 \text{ dyne/cms}^{-1}$. Determine it's Q value.
- f) The volume of the space in a hall is 1500m^3 . The total surface area of absorber's present is 150m^2 in open window units. Determine the reverberation time for the hall.

Q2) a) Set up differential equation for the undamped oscillation and obtain solution of it. **[6]**

OR

Derive the condition of velocity resonance and obtain amplitude of velocity at resonance.

- b) Define quality factor. Derive the expression for quality factor of damped oscillation. **[4]**

P.T.O.

Q3) a) Prove that velocity of transverse wave over a string of linear density μ is

$$C = \sqrt{\frac{T}{\mu}} \text{ where, } T \text{ is Tension.} \quad [6]$$

OR

Using power resonance curve, establish the relation between the band width and quality factor.

b) The equation of damped motion is given as [4]

$$2 \left[\frac{d^2x}{dt^2} \right] + 12 \left[\frac{dx}{dt} \right] + 50x = 0$$

Find the frequency of damped oscillations.

Q4) a) Show that rate of absorption of energy is equal to the rate of dissipation energy in case of forced oscillator. [6]

OR

Give analytical treatment for composition of two SHM'S perpendicular to each other and having frequency ratio 1:2. Discuss the case when phase difference is zero and $\pi/2$ radian.

b) A particle performing SHM has velocities 8cm/sec and 10cm/sec. When it is at distances 5cm and 4cm respectively from the mean position? What is its amplitude? [4]

Q5) Write short notes on any four of the following. [10]

- a) Lissajous figures
- b) Primary or P-Waves
- c) Sound Intensity
- d) Resonance and its application
- e) Reverberation time
- f) Equilibrium and its types



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PD1531

[6467]-405

S.Y. B.Sc. (Regular)

PHYSICS

PHY - 242 : Optics

(2019 Pattern) (Credit System) (Semester - IV) (24122)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Use of calculator is allowed.*
- 5) *Figures to the right indicate full marks.*

Q1) Solve any Five of the following :

[5]

- a) What do you mean by aberration?
- b) What do you mean by Cardinal points?
- c) Define magnifying power of compound microscope.
- d) Two thin convex lenses having focal length 15 cm and 30 cm are placed co-axially 20 cm apart. Find the equivalent focal length of optical system.
- e) Define the term Interference of Light.
- f) What is diffraction of Light.

Q2) a) Derive lens equation for thin lens.

[6]

OR

Show that refraction at single curved surface obeys an equation

$$\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R} .$$

[6]

- b) Draw ray diagram of simple microscope. Derive an expression for magnifying power of simple microscope.

[4]

P.T.O.

- Q3) a)** Explain the formation of Newton's ring with diagram and Derive the diameter of bright ring. [6]

OR

State and explain Brewsters Law. [6]

- b) Two thin convex lenses of same material having focal length F_1 and F_2 are separated by distance 10 cm. The combination of lenses satisfies the condition for non-chromatic aberration. Find the value of F_1 , F_2 and F . [4]

- Q4) a)** Explain construction and working of Hugen's eye-piece with neat ray diagram. [6]

OR

Prove that for combination of two thin lenses of focal lengths F_1 and F_2 separated by distance x , the focal length of combination is given by

$$\frac{1}{F} = \frac{1}{F_1} + \frac{1}{F_2} - \frac{x}{F_1 F_2} . \quad [6]$$

- b) Glass plate is to be used as a polarizer. Find the angle of polarization for it. Also find the angle of refraction if μ for glass is 1.54. [4]

- Q5)** Write short notes on any four of the following : [10]

- a) Write a note on Coma aberration.
- b) Write a note on Fraunhofer's Diffraction.
- c) Write a note on any two method to reduce the spherical aberration.
- d) Polarized Light.
- e) Write note on constructive interference.
- f) Rayleigh criteria for resolution.



Total No. of Questions : 5]

SEAT No. :

PD-2678

[Total No. of Pages : 2

[6467]-406

S.Y. B.Sc.

CHEMISTRY

CH - 401 : Physical & Analytical Chemistry

(2019 Pattern) (Credit System) (Semester - IV) (24131) (Regular)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) Q.1 is compulsory.
- 2) Solve any three questions form Q.2 to Q.5.
- 3) Question No.2 to 5 carry equal marks.
- 4) Use of calculator & log table are allowed.
- 5) Figures to the right indicate full marks.

Q1) Write any Five of the following :

[5]

- a) Define degree of freedom.
- b) What is conjugate solution.
- c) The transmittance of solution of a substance was found to be 90% calculate absorbance.
- d) Define specific conductance.
- e) What is ion exchanger.
- f) Define mole fraction.

Q2) a) Attempt any two of the following :

[6]

- i) Explain Monovariant & bivariant system.
- ii) What are azeotropic mixtures. Write methods used for their separation.
- iii) What is mean by equivalent conductance? How it is determined.
- b) Discuss the essential components of a spectrophotometer with block diagram

[4]

P.T.O.

Q3) a) Attempt any two of the following : [6]

- i) Explain the method of purification of water by ion exchange chromatography.
- ii) Explain the phase diagram of sulphur system.
- iii) What are P-N & T-N diagrams. Discuss different types of P-N & T-N diagrams in case of completely miscible liquids.

b) Attempt the following : [4]

- i) A cell constant of conductance cell is 0.2656 cm^{-1} . It was filled with 0.05M NaCl solution whose resistance is found to be 325 ohm. Calculate equivalent conductance of NaCl solution.
- ii) The electrodes in the cell are 0.8cm apart & have area of 0.7628 cm^2 . What will be the cell constant?

Q4) a) Attempt any two of the following : [6]

- i) What is triple point? Explain its significance in water system.
- ii) Explain size exclusion chromatography in detail with one application.
- iii) Explain positive & negative deviations of binary liquid system.

- b) The resistance of a 0.1N solution of an electrolyte was found to be 210nm at 25°C . Calculate the equivalence conductance of the solution of 25°C . If the electrodes in the cell are 0.8cm apart and have an area of 0.7628 cm^2 .

[4]

Q5) Write short notes on any four of the following : [10]

- a) Different types of equilibria in connection with phase rule.
- b) Phenol-water system.
- c) Photomultiplier tubes.
- d) Cation exchange resins.
- e) Effect of pH on the separation of amino acid.
- f) Kohlraush's law of independent Migration of ions.



Total No. of Questions : 5]

SEAT No. :

PD1532

[Total No. of Pages : 2

[6467]-407

S.Y.B.Sc. (Regular)

CHEMISTRY

CH-402 : Inorganic and Organic Chemistry

(2019 Pattern) (CBCS) (Semester -IV) (24132) (Paper-II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Questions 2 to 5 carry equal marks.
- 4) Figures to the right indicates full marks.

Q1) Attempt any five of the following. [5]

- a) Define Isomerism.
- b) What is hybridization of $[\text{Ni}(\text{CN})_4]^{2-}$?
- c) Find the number of unpaired electrons in d^5 strong field octahedral complex.
- d) What is Iodoform test?
- e) Give an example of carboxylic acid.
- f) How will you obtain p-nitroaniline from aniline?

Q2) a) Answer any Two of the following [6]

- i) Explain ligand isomerism with suitable example.
 - ii) Write assumptions of VBT
 - iii) Calculate CFSE of Fe^{2+} ion in strong octahedral field (At. No. Fe=26)
- b) Attempt the following [4]
- i) Why trans 1,2-dimethyl cyclohexane is optically active?
 - ii) Give drawbacks of Baeyer's strain theory

Q3) a) Answer any two of the following [6]

- i) What are amines? How will you prepare ethyl amine from
 - 1) methyl cyanide
 - 2) Nitroethane
- ii) What are aldehydes? How is benzaldehyde prepared from
 - 1) Toluene
 - 2) Benzoyl chloride
- iii) Explain Perkin reaction with suitable example

b) Write the assumptions of CFT [4]

P.T.O.

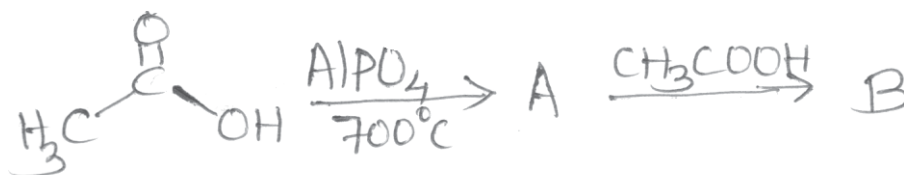
Q4) a) Attempt any two of the following **[6]**

- i) Explain Inner and outer orbital complexes
- ii) What are esters? How is ethyl acetate prepared from
 - 1) acetic acid
 - 2) acetyl chloride
- iii) What is carboxylic acid? Give any two derivatives of carboxylic acid.

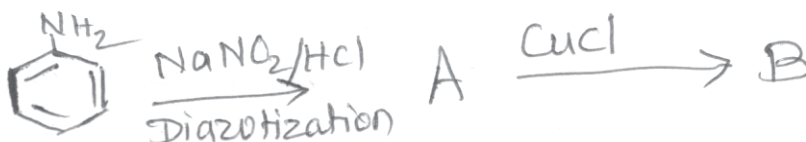
b) Calculate CFSE for d^4 ion in weak & strong octahedral field. **[4]**

Q5) Attempt any four of the following. **[10]**

- a) Draw the shapes of d-orbitals
- b) Write a note on spectrochemical series
- c) Explain the bonding, structure and magnetic properties of $[Cr(H_2O)_6]^{3+}$ complex [At No. of Cr=24]
- d) Identify the products 'A' & 'B' and rewrite the reaction



e) Predict the products.



f) Explain locking conformation.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PD1533

[6467]-408

S.Y. B.Sc. (Regular)

BOTANY - I

BO - 241 : Plant Anatomy and Embryology

(CBCS 2019 Pattern) (Semester - IV) (Paper - I) (24141)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Attempt any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Figures to the right indicate full marks.*
- 5) *Draw neat labelled diagrams wherever necessary.*

Q1) Attempt any five of the following.

[5]

- a) Define Anatomy.
- b) What is stomata?
- c) Define mechanical tissue system.
- d) What is embryology?
- e) What is bitegmic ovule?
- f) What is cross pollination?

Q2) a) Explain the process of anomalous secondary growth in bignonia stem.**[6]**

b) Describe monosporic embryo sac. **[4]**

Q3) a) Describe the structure of tetrasporangiate anther. **[6]**

b) Explain the process of normal secondary growth in Dicot stem. **[4]**

P.T.O.

Q4) a) Describe the structure of typical Dicot and monocot stomata. **[6]**

b) Explain significance of double fertilization. **[4]**

Q5) Write short notes on any four of the following. **[10]**

a) Inflexibility

b) Scope of anatomy in wood identification

c) Nuclear endosperm

d) Anatropous ovule

e) Monocot embryo

f) Porogamy



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PD1534

[6467]-409

Second Year B.Sc. (Regular)

BOTANY

BO- 242 : Plant Biotechnology

(2019 Pattern) (Credit System) (Semester-IV) (Paper-II) (24142)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.*
- 2) Solve any Three questions from question No.2 to Q No.5.*
- 3) Question No.2 to Q No.5 carry equal marks.*
- 4) Figures to the right indicate full marks.*
- 5) Draw neat labelled diagrams wherever necessary.*

Q1) Answer any 5 of the following.

[5]

- a) What is sterilization?
- b) Define gene cloning.
- c) Write two renewable energy sources.
- d) What is microbial remediation?
- e) Write two algal sources of SCP.
- f) What is explant?

Q2) a) Describe protoplast fusion and write it's applications.

[6]

b) Explain importance of protein in diet.

[4]

Q3) a) Describe concept of bioinformatics and write classification of databases.

[6]

b) Write steps of media preparation.

[4]

P.T.O.

Q4) a) Describe gene cloning technique and write its applications. [6]

b) Explain concept of biogas. [4]

Q5) Write short notes on any four of the following. [10]

a) Current status of biotechnology

b) Inoculation

c) Restriction enzyme

d) Proteomics

e) Phytoremediation

f) SCP



Total No. of Questions : 5]

SEAT No. :

PD1535

[Total No. of Pages : 2

[6467]-410

S.Y. B.Sc. (Regular)

ZOOLOGY

ZO - 241 : Animal Diversity - IV

(2019 Pattern) (Credit System) (Semester - IV) (Paper - I) (24151)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Solve any five of the following. [5]

- a) Write the scientific name of Rat.
- b) Give any two examples of venomous snake.
- c) Give an example of egg laying mammals.
- d) Give function of internal ear of rat.
- e) Give an example of swimming feet.
- f) Give function of pancreas of rat.

Q2) a) Write a note on any three types of beak modification in birds. [6]

OR

Describe the male reproductive system of rat. [6]

b) Describe cursorial adaptations in mammals. [4]

Q3) a) Give salient features of class reptilia. [6]

OR

Describe the alimentary canal of rat. [6]

b) What is migration? Describe altitudinal migration in birds. [4]

P.T.O.

Q4) a) Sketch and label v.s. of eye of rat. **[6]**

OR

Sketch and label dorsal view of brain of rat. **[6]**

b) Give salient features of class mammalia. **[4]**

Q5) Write short note on any four of the following. [10]

- a) First aid treatment of snake bite.
- b) Habit and habitat of rat
- c) Liver of rat
- d) Food and feeding mechanism in rat
- e) Functions of brain of rat
- f) Desert adaptations in reptiles



Total No. of Questions : 5]

SEAT No. :

PD1536

[Total No. of Pages : 2

[6467]-411

S.Y.B.Sc. (Regular)

ZOOLOGY

ZO - 242 : APPLIED ZOOLOGY - II

(2019 Pattern) (Credit System) (Semester - IV) (Paper - II) (24152)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Question 2 to 5 carry equal marks.*

Q1) Solve any five of the following. [5]

- a) Define Apiculture.
- b) Define Brackish water fisheries.
- c) Give uses of queen excluder.
- d) Define craft.
- e) Give the name of bacterial disease of honey bee.
- f) Give biological name of rock bee.

Q2) a) Describe life cycle of Honey bee. [6]

OR

Describe habit, habitat and culture method of Labeo Rohita.

b) Describe fresh water fisheries. [4]

Q3) a) Describe round dance and wagtail dance in honey bee. [6]

OR

Describe harvesting method of Harpodon and Mackerel.

b) Explain honey extractor. [4]

P.T.O.

Q4) a) Give uses of honey and royal jelly. **[6]**

OR

Describe cast net and dol net.

b) Describe rainy season management in bee keeping. **[4]**

Q5) Write short notes on any four of the following. **[10]**

- a) Fish meal.
- b) Habit and habitat of *Apis Mellifera*
- c) Salting
- d) Smoker in bee keeping
- e) Bee pollination
- f) Freezing



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PD1537

[6467]-412

S.Y. B.Sc. (Regular)

GEOLOGY

**GL-221 : Global Tectonics and Geodynamics of the Lithosphere
(2019 Pattern) (Credit System) (Semester - IV) (24161)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question No. 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Q.2 to Q.5 carry equal marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following (Any 5)

[5]

- a) Name any two cratons of India.
- b) Enlist the types of plate boundaries.
- c) Give the composition of Earth's core.
- d) Define Isostasy.
- e) Enlist the various sources of information about the Earth's interior.
- f) Define Lithosphere

Q2) Answer the following :

- a) Explain various evidences for continental drift. **[6]**
- b) Give the composition of crust, mantle and core. Draw a neat labelled diagram of interior of Earth. **[4]**

Q3) Answer the following :

- a) Define Isostasy. Explain concept of Isostasy. Explain Pratt's hypothesis. **[6]**
- b) Name different Indian Cratons. Explain any two. **[4]**

P.T.O.

Q4) Answer the following :

- a) Explain Wilson's Cycle. [6]
- b) Explain characteristics features of plate boundary. [4]

Q5) Write a note on (Any 4) : [10]

- a) Morphology of ocean floor
- b) Asthenosphere
- c) Singhbhum Mobile belt
- d) Continent and oceanic crust
- e) Low velocity zone
- f) Seafloor spreading applications



Total No. of Questions : 5]

SEAT No. :

PD1538

[Total No. of Pages : 2

[6467]-413

S.Y.B.Sc. (Regular)

GEOLOGY

**GL 222 : Environmental Geology & Geogenic Disasters
(2019 Pattern) (Semester - IV) (Credit System) (24162)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question no.1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Q.2 to Q.5 carry equal marks.
- 4) Neat diagrams must be drawn whenever necessary.

Q1) Answer Any Five of following questions in 2-3 lines. **[5]**

- a) What is Air quality index?
- b) What is Meant by landslide?
- c) Enlist type of cyclone
- d) Define Richster scale
- e) What is Blue baby syndrome?
- f) What is full form of BIS?

Q2) Answer the following.

- a) What is Disaster? Describe types of Disaster. **[6]**
- b) Explain any two water quality parameters. **[4]**

Q3) Answer the following.

- a) Define Hydrogeological cycle? Describe in detail with neat labeled diagram. **[6]**
- b) What is point & non point source pollution. **[4]**

P.T.O.

Q4) Answer the following.

- a) What are volcanos? Describe nature of volcanic hazard. [6]
- b) Explain Mitigation measure against flood. [4]

Q5) Write short notes on any four. [4×2½=10]

- a) BOD & COD.
- b) Mercali & Richter Scale.
- c) Fissure type of eruption.
- d) Surface water Resources.
- e) Minamata disease.
- f) Tropical & Mid-latitude cyclone.

* * *

Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 3

PD1539

[6467]-414

S.Y. B.Sc. (Regular)

STATISTICS

**ST-241 : Tests of Significance and Statistical Methods
(2019 Pattern) (Credit System) (Semester - IV) (Paper - I) (24171)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Use of calculator and statistical table is allowed.*
- 4) Symbols and abbreviations have their usual meaning.*

Q1) Attempt each of the following :

A) In each of the following cases, choose correct alternative. **[1 each]**

- a) If $N.R.R < 1$ then there is _____
 - i) Reduction in population
 - ii) Increase in population
 - iii) Constancy in population
 - iv) All the above
- b) The regression planes coincide if
 - i) $|R| = 0$
 - ii) $|R| < 0$
 - iii) $|R| > 0$
 - iv) $|R| = 1$
- c) Type II error is
 - i) Accepting H_0 when it is false
 - ii) Rejecting H_0 when it is false
 - iii) Accepting H_0 when it is true
 - iv) Rejecting H_0 when it is true

B) In each of the following state whether the given statement is true or false. **[1 each]**

- a) Expected length of queue is not same as average length of system.
- b) Hypothesis is a statement of possible errors about H_0 .

P.T.O.

Q2) Attempt any two of the following :

[5 each]

- a) If $r_{12,3} = 0$ then show that,

$$r_{13,2} = r_{13} \sqrt{\frac{1 - r_{23}^2}{1 - r_{12}^2}}$$

- b) Define the following terms :

- i) Crude Birth Rate (C.B.R.)
- ii) General Fertility Rate (G.F.R.)
- iii) Age-Specific Fertility Rate (A.S.F.R.)

- c) An airport claims that 95% of Passengers pass through security screening without any issue. A quality check on 600 randomly selected passengers. Find the 555 passed without issues. Can we conclude that proportion of passengers who pass without issues is less than 95%? Use 10% level of significance.

Q3) Attempt any two of the following :

[5 each]

- a) A call centre has a single customer service representative calls arrive at an average rate of 4 per hour, follows a Poisson process. The representative follows an exponential distribution can serve calls at an average rate of 6 per hour.

Find :

- i) Average number of customers in the queue.
- ii) Traffic intensity.
- iii) Average time a customer spends in the system.

- b) Explain the following terms in short

- i) Estimator
- ii) Standard error of statistic

- c) In a trivariate distribution

$$\sigma_1^2 = 9, \quad \sigma_2^2 = 16, \quad \sigma_3^2 = 16$$

$$r_{12} = 0.7, \quad r_{13} = r_{23} = 0.6$$

Find :

- i) $R_{2,13}$
- ii) $\sigma_{2,13}^2$

Q4) Attempt any one of the following :

[10]

- a) i) Given the following table, calculate Gross Reproduction Rate (G.R.R.) and Net Reproduction Rate (N.R.R.) **[6]**

Age Group	15-19	20-24	25-29	30-34	35-39	40-44
Female population (in 1000)	18	15	14	14	16	13
Female births	540	600	700	560	480	442
Survival rate	0.95	0.94	0.93	0.92	0.91	0.90

- ii) State characteristics of queuing mode. Also, describe any one characteristic in brief. **[4]**
- b) i) For a trivariate data on (X_1, X_2, X_3) , if $\bar{X}_1 = \bar{X}_2 = \bar{X}_3 = 0$, $\sigma_1 = \sigma_2 = \sigma_3 = 1$ and $r_{12} = r_{13} = r_{23} = 0.2$, then obtain the equation of least square regression plane of X_3 on X_1 and X_2 . **[5]**
- ii) Explain how to construct a $100(1 - \alpha)\%$ confidence interval for population mean (μ), when sample is drawn from a normal population with known standard deviation (σ) while testing $H_0 : \mu = \mu_0$ Vs $H_1 : \mu \neq \mu_0$. **[5]**



Total No. of Questions : 4]

SEAT No. :

PD1540

[Total No. of Pages : 2

[6467]-415

S.Y.B.Sc. (Regular)

STATISTICS

ST-242: Sampling Distribution and Exact Tests

(2019 Pattern) (Credit System) (Semester - IV) (24172)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of calculator and statistical table is allowed.*
- 4) *Symbols and abbreviations have their usual meaning.*

Q1) Attempt each of the following:

[1 Each]

A) Choose the correct alternative in each of the following:

a) Let $X \rightarrow G(5, 4)$ then distribution of random variable $Y = 5X$ is.

- | | |
|----------------|-----------------|
| i) $G(25, 4)$ | ii) $G(5, 20)$ |
| iii) $G(1, 4)$ | iv) $G(5, 4/5)$ |

b) If a random variable has chi-square distribution with variance 4 then it's m.g.f. is _____.

- | | |
|-------------------|-------------------|
| i) $(1-2t)^{-1}$ | ii) $(1-2t)^{-2}$ |
| iii) $(1-t)^{-1}$ | iv) $(1-t)^{-2}$ |

c) If variance of χ^2 random variable is 18 then it's mode is:

- | | |
|--------|--------|
| i) 6 | ii) 7 |
| iii) 8 | iv) 16 |

B) In each of the following, state whether the given statement is true or false: **[1 Each]**

- a) Chi-square distribution is a particular case of Gamma distribution.
- b) In a paired t test, observations in two samples are independent of each other.

Q2) Attempt any two of the following:

[5 Each]

- a) State and prove the additive property of chi-square distribution.
- b) If $Y \rightarrow \chi^2_{15}$ find
 - i) $P(y \geq 10.307)$
 - ii) $P(8.547 \leq y \leq 19.311)$
 - iii) Median of y
- c) Derive mode of F-distribution with n_1, n_2 degrees freedom.

P.T.O.

Q3) Attempt any two of the following:

[5 Each]

- a) Let $(x_i, i = 1, 2, 3, 4, 5)$ be *i.i.d* $N(0, 4)$ variates

$$\text{Find } P\left(\frac{2 \times 5}{\sqrt{x_1^2 + x_2^2 + x_3^2 + x_4^2}} \geq 1.19\right).$$

- b) Derive an expression for mode of random variable $F(n_1, n_2)$.
c) State probability density function of $G(\lambda, \alpha)$ Also find it's mean and variance.

Q4) Attempt any one of the following:

- a) i) Certain pesticide is packed into bags by a machine. A random sample of 10 bags is drawn and their weights (in kg) are found as follows:[5]
50, 49, 52, 44, 45, 48, 46, 45, 49, 45
Test whether the average weight of a bag is 50kg? Also construct 99% confidence interval for mean weight of bag.
ii) Show that if x and y are independent χ^2 variate with m and n d.f. respectively then $x + y$ and $\frac{x}{y}$ are independently distributed.[5]
- b) i) Let $\bar{X}$ and S^2 be the mean and variance of a random sample of size 25 from $N(5, 9)$ distribution. Evaluate $2 P(3.8 < \bar{X} < 5.6, 5.637 < S^2 < 11.951)$. [5]
ii) Show that all odd ordered central moments of t-distribution with n degrees of freedom are zero. [5]



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PD1541

[6467]-416

S.Y. B.Sc. (Regular)

GEOGRAPHY

GG - 241 : Environmental Geography - II

(2019 CBCS Pattern) (Semester-IV) (Paper - I) (24181)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Attempt any Three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*
- 4) *Use of map stencil is allowed.*

Q1) Answer the following questions in 20 words (Any Five) : **[5]**

- a) Write any two benefits of EIA.
- b) What is conservation?
- c) When did the Stockholm conference take place?
- d) Write any two effect of solid waste.
- e) What is a holistic approach?
- f) What is the aim of Kyoto protocol?

Q2) a) Answer the following questions in 100 words (Any Two) : **[6]**

- i) Describe the objectives of Wild Life Protection Act 1972.
- ii) Describe the aspects of environmental management.
- iii) Write steps in Environment Impact Assessment.

b) Answer the following question in 150 words (Any One) : **[4]**

- i) Explain the Adhoc method of Environment Impact Assessment.
- ii) Write principles of environmental planning.

P.T.O.

- Q3) a)** Answer the following questions in 100 words (Any Two) : **[6]**
- i) What is solid waste management?
 - ii) Explain the purpose of EIA.
 - iii) Explain any three principles of environmental protection in the Stockholm conference.
- b)** Answer the following question in 150 words (Any One) : **[4]**
- i) State the reasons for holding the world summit 2002.
 - ii) Why forest conservation necessary?
- Q4) a)** Answer the following questions in 100 words (Any Two) : **[6]**
- i) Write any two environmental policies in developed country in detail.
 - ii) Write major environmental laws in India.
 - iii) Describe the nature of Environment Impact Assessment.
- b)** Answer the following question in 150 words (Any One) : **[4]**
- i) Explain measures of environmental conservation.
 - ii) Describe the importance of Tiger conservation programme in India.
- Q5) Write short notes on the following (Any Four) : **[10]****
- a) Ganga action plan.
 - b) Scope of Environment Impact Assessment.
 - c) Environment Protection Act - 1986.
 - d) Role of NGO in environmental conservation.
 - e) Approaches of environmental management.
 - f) Sustainable Development Summit, New York 2015.



Total No. of Questions : 5]

SEAT No. :

PD1542

[Total No. of Pages : 2

[6467]-417

S.Y. B.Sc. (Regular)

GEOGRAPHY

GG-242 : Geography of Maharashtra (Human - II)
(2019 Pattern) (Credit System) (Semester - IV) (24182)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q. No. 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Solve any five questions of the following : **[5]**

- a) Which religion is having more percentage in Maharashtra?
- b) What is meant by migration?
- c) Write two names of cash crops in Maharashtra.
- d) Which city is known as Manchester of Maharashtra?
- e) Which cities forming golden triangle of Maharashtra?
- f) Write full form of IT.

Q2) a) Answer the following questions in 100 words. (Any two) **[6]**

- i) Give brief account of road transport in Maharashtra.
- ii) Explain cotton textile in Maharashtra.
- iii) Which are the problems of Agriculture in Maharashtra.

b) Answer the following question in 150 words. (Any one) **[4]**

- i) Explain spatial distribution of religion in Maharashtra.
- ii) Discuss in detail about 'Samaruddhi Marg'.

Q3) a) Answer the following questions in 100 words. (Any two) **[6]**

- i) How electronic media is important in communication?
- ii) Which are the characteristics of rural to urban migration?
- iii) Explain the problems of sugarcane industry.

b) Answer the following question in 150 words. (Any one) **[4]**

- i) Explain IT sector in brief.
- ii) Discuss geographical required condition for Jowar in Maharashtra.

P.T.O.

Q4) a) Answer the following questions in 100 words. (Any two) [6]

- i) Discuss scope of wine industry in Maharashtra.
- ii) Explain adverse effects of Social Media.
- iii) Write Geographical required condition for Graph in Maharashtra.

b) Answer the following question in 150 words. (Any one) [4]

- i) How interstate migration is problem in Maharashtra.
- ii) Which are the prospects of Agriculture in Maharashtra.

Q5) Write short notes on any four of the following : [10]

- a) Cash crop
- b) Hindu religion
- c) Agro based industry
- d) Air transport
- e) Metro transport
- f) MIDC



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PD1543

[6467]-418

S.Y. B.Sc. (Regular)

MICROBIOLOGY

MB - 241 : Bacterial Genetics

(2019 Pattern) (CBCS) (Semester-IV) (Paper - I) (24191)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any Three questions from Q.2 to Q.5.*
- 3) *Questions Q.2 to Q.5 carry equal marks.*
- 4) *Draw neat labelled diagrams wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Solve any Five of the following :

[5]

- a) Define : Missense Mutation.
- b) Draw the structure of Cytosine.
- c) What are different components of nucleoside?
- d) What is the function of DNA ligase?
- e) What is Amber mutation?
- f) State True/False : Nucleotide of 5' position of codon is said to be Wobble.

Q2) a) Answer the following (any Two) :

[6]

- i) Enlist various bonds present in the structure of DNA.
 - ii) Explain conditional lethal mutants with example.
 - iii) What are plasmids? Give any two properties of plasmids.
- b) Diagrammatically explain Frankel-Cornat & Singer's Experiment. **[4]**

P.T.O.

Q3) a) Explain the following (any Two) : **[6]**

- i) Enlist various enzymes involved in DNA Replication.
- ii) Suppressor mutation.
- iii) Initiation in Protein Synthesis.

b) Describe Hershey & Chase experiment with the help of diagram. **[4]**

Q4) a) Discuss the following (any Two) : **[6]**

- i) Rolling circle replication.
- ii) Mutagenesis by 2-amino purine.
- iii) Mutagenesis by Intercalating Agents.

b) Describe Fluctuation Test with the help of suitable diagram. **[4]**

Q5) Write short notes on any four of the following : **[10]**

- a) Types of RNA with their functions.
- b) Conservative model of DNA replication.
- c) A form of DNA.
- d) Replica plate Technique.
- e) Initiation of Transcription.
- f) Gierrer & Schrams experiment.



Total No. of Questions : 5]

SEAT No. :

PD-1544

[Total No. of Pages : 2

[6467]-419

S.Y. B.Sc.

MICROBIOLOGY

MB - 242 : Air, Water & Soil Microbiology

(CBCS) (2019 Pattern) (Semester - IV) (Paper - II) (24192)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q.1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions No.2 to 5 carry equal marks.*
- 4) *Draw neat labelled diagrams wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) Solve any Five of the following :

[5]

- a) Define Droplet nuclei.
- b) Enlist any two physical agents used for the air sanitation.
- c) What is ground water?
- d) Write the name of any two chemical methods of water purification.
- e) Write the use of Anabena azollae.
- f) State whether true or false. Whooping Cough is caused by Yersinia Pestis.

Q2) a) Attempt the following : (Any Two)

[6]

- i) Write causative agent and symptoms of tuberculosis.
 - ii) Explain the water purification using filtration.
 - iii) Explain mutualism and predation using suitable examples.
- b) Write the principle and significance of Eijkman Test.

[4]

P.T.O.

Q3) a) Attempt the following : (Any two) [6]

- i) Explain the sedimentation method of air sampling.
 - ii) Explain the beneficial effects of plant growth promoting Rhizobacteria on plant growth.
 - iii) Enlist various functions of central pollution Control Board
- b) Explain the carbon cycle with suitable diagram. [4]

Q4) a) Attempt the following : (Any two) [6]

- i) Explain any two chemical methods of air sanitation.
 - ii) Write the principle and procedure of completed test for bacteriological analysis of potable water.
 - iii) Explain the role of microorganisms in composting.
- b) Describe steps involved in the preparation of Rhizobium bioinoculant.[4]

Q5) Write short notes on any four of the following : [10]

- a) Biocontrol agents.
- b) Ammonification and Nitrification.
- c) New indicators of Fecal pollution.
- d) Applications of Biofertilizers.
- e) Symbiosis and parasitism.
- f) Bacteriological quality of drinking water suggested by World Health Organization (WHO)



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PD1545

[6467]-420

S.Y. B.Sc. (Regular)

NANOSCIENCE AND NANOTECHNOLOGY

**NS - 241 : Organic and Polymer Science of Nanomaterials
(2019 Pattern) (Credit System) (Semester-IV) (Paper - I) (24261)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.*
- 2) Solve any 3 questions from Q.2 to Q.5.*
- 3) Draw the neat and labelled diagram wherever necessary.*
- 4) Figures to the right indicate full marks.*

Q1) Answer any five of the following :

[5×1=5]

- a) Define the term polymer.
- b) Define Nanocomposites.
- c) Define number average molecular weight of Polymer.
- d) Define Bio-Polymer.
- e) What is Graphene?
- f) What is Homochain and Hetrochain?

Q2) a) Explain in detail the classification of Polymer.

[6]

OR

Give the application of carbon nanotubes.

b) What is Nanofillers? Explain the classification of nanofillers.

[4]

P.T.O.

Q3) a) Explain mechanism of free radical. [6]

OR

Explain the Electrochemical Polymerisation.

b) Explain the methods for synthesis of conducting Polymer. [4]

Q4) a) Explain in detail solution Polymerisation and Suspension Polymerisation. [6]

OR

Explain in detail Cationic Polymerisation.

b) Explain the Growth mechanism of carbon nanotubes. [4]

Q5) Write short notes on any Four of the following : [10]

- a) Polymer.
- b) Liquid Crystalline Polymerisation.
- c) Emulsion Polymerisation.
- d) Application of Graphene.
- e) Carbon Nanotubes.
- f) Addition Polymerisation.



Total No. of Questions : 5]

SEAT No. :

PD1546

[Total No. of Pages : 2

[6467]-421

S.Y. B.Sc. (Regular)

NANOSCIENCE AND NANOTECHNOLOGY

**NS-242 : Advanced Techniques for Characterization of Nanomaterials
(2019 Pattern) (Credit System) (Semester - IV) (Paper - II) (24262)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q. No. 1 is compulsory.*
- 2) Solve any three questions from Q.2 to Q.5.*
- 3) Question 2 to 5 carry equal marks.*
- 4) Draw neat & labelled wherever necessary.*
- 5) Figures to the right indicate full marks.*

Q1) Attempt any five of the following : **[5]**

- a) What is the principle of FESEM?
- b) Enlist the parts of EDAX.
- c) State the principle of DSC analysis.
- d) What is mean by DC SQUIDS?
- e) Give any two advantages of Fluorescence microscopy.
- f) What is the use of lock in amplifier in USM?

Q2) A) Attempt any one of the following : **[6]**

- a) With proper diagram explain TEM.
- b) Explain Fluorescence microscopy with neat labeled diagram.

B) Write down the application of SEM. **[4]**

Q3) A) Attempt any one of the following : **[6]**

- a) With neat labeled diagram explain ESEM. Also give applications of ESEM.
- b) Explain the sample preparation for TEM.

B) Explain bright field imaging method. **[4]**

P.T.O.

Q4) A) Attempt any one of the following. [6]

- a) Draw neat diagram of confocal microscopy. Also give applications of confocal microscopy.
- b) Define dimpling process. Give the advantages & disadvantages of TEM.

B) Explain selected Area electron diffraction method. [4]

Q5) Write a short notes on any four of the following : [10]

- a) Ion milling process
- b) Principle of confocal microscopy
- c) Elastic & Inelastic interaction
- d) Principle of VSM.
- e) Types of SQUIDS
- f) Applications of DSC analysis



Total No. of Questions : 5]

SEAT No. :

PD-1547

[Total No. of Pages : 2

[6467] - 422

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL-241: Analog Circuit Design

(24221) (2019 Pattern) (CBCS) (Semester - IV) (Paper - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q. 1 is compulsory*
- 2) *Solve any three questions from Q. 2 to Q. 5.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Solve any five of the following : **[5]**

- a) What do you mean by passive heatsink ?
- b) Define Bandwidth of an amplifier.
- c) Comment “By using negative feedback the bandwidth of an amplifier increases”.
- d) What is conversion efficiency of class B amplifier?
- e) What is bode plot?
- f) Define Distortion

Q2) Answer the following :

- a) i) What are the different types of oscillator? **[2]**
- ii) Draw and explain function generator circuit using OP-AMP. **[4]**
- b) Determine the frequency of Wein bridge oscillator for $R_1 = R_2 = 5K\Omega$ & $C = 0.01\mu F$ **[4]**

P.T.O.

Q3) Answer the following :

- a) i) Draw the circuit diagram of two stage RC coupled amplifier. [2]
- ii) Explain class B push pull amplifier. [4]
- b) Explain the concept of Negative Feedback [4]

Q4) Answer the following :

- a) i) Which factor should be considered while selecting PA system. [2]
- ii) Explain the working of Integrator circuit [4]
- b) A power transistor dissipates 5W energy if the junction temperature $T_j \text{ max} = 90^\circ\text{C}$ and thermal resistance $Q = 8^\circ\text{C/W}$, calculate maximum ambient temperature at which it can be operated. [4]

Q5) Attempt any four of the following : [10]

- a) What is mean by thermal runaway?
- b) Draw & explain differentiator circuit
- c) Differentiate between positive feedback and negative feedback
- d) What is mean by cross-over distortion?
- e) Explain various types of coupling used in amplifier.
- f) What is mean by dc loadline?



Total No. of Questions : 5]

SEAT No. :

PD1548

[Total No. of Pages : 2

[6467]-423

S.Y.B.Sc. (Regular)

ELECTRONIC SCIENCE

**EL-242: Microcontroller and Python Programming
(2019 Pattern) (Credit System) (Semester - IV) (Paper - II) (24222)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Q.2 to Q.5 carry equal marks.

Q1) Solve any five of the following. [5]

- a) What do you mean by Arduino.
- b) Write any two features of Arduino Uno.
- c) Which microcontroller is used in Arduino Uno.
- d) What is the use of break statement in python?
- e) Define string in python.
- f) List the two types of functions.

Q2) a) Answer the following.

- i) Write the structure of Arduino program. [2]
- ii) Explain bitwise operators. If A = 60 and B = 13 then what will be the result of 'A & B' and 'A ^ B'. [4]

b) Write Arduino program to interface switch and LED to Arduino Uno. [4]

Q3) a) Answer the following.

- i) Write syntax and example of 'Pin Mode ()' function. [2]
- ii) What is the use of 'Serial begin' function? Write arduino program to display string on serial monitor. [4]

b) Write syntax of 'for' loop statement and give its example as Arduino program. [4]

Q4) a) Answer the following.

- i) What is the difference between list and tuple. [2]
- ii) Explain 'pass' and 'continue' statement in python. [4]

b) Write python program to find factorial of number. [4]

P.T.O.

Q5) Solve any four of the following.

[10]

- a) If $A = 60$ and $B = 13$ then what is the result of ' A/B ' and ' $\sim A$ '.
- b) Write Arduino program to make pin 2 and 5 of Arduino input and output respectively.
- c) Write a note on python variables.
- d) Give example of 'while' loop statement in python.
- e) Explain any three dictionary operations.
- f) Explain 'if-else' statement used in python with suitable example.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PD1549

[6467]-424

S.Y. B.Sc. (Regular)

PSYCHOLOGY

Health Psychology

(2019 Pattern) (Credit System) (Semester - IV) (Paper - I) (24201)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Solve any five of the following : **[5]**

- a) Who developed the bio-psychosocio model?
- b) Define Eustress
- c) What is catastrophic thinking?
- d) What is the meaning human virtues?
- e) Define well-being.
- f) Define optimism

Q2) a) Explain the Emotions focused coping pattern. **[6]**

OR

Describe the health protective behaviours.

b) Categorise the various health enhancing behaviours. **[4]**

Q3) a) Discuss the types, causes and treatment of diabetes as a cronic illness. **[6]**

OR

Explain the role of resilience in health & wellbeing.

b) Analyze the cognitive component of health. **[4]**

P.T.O.

Q4) a) Explain in detail the problem focused coping pattern. [6]

OR

Describe in brief the role of life satisfaction to health.

b) Examine the sources of stress. [4]

Q5) Write short notes any four of the following : [10]

- a) Blood pressure
- b) Types of stress
- c) Illness management
- d) Goals of health Psychology
- e) Nature of coping
- f) Happiness & Health



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

PD1550

[6467]-425

S.Y.B.Sc. (Regular)

PSYCHOLOGY

Psychological Testing & Application

(2019 Pattern) (Semester - IV) (Credit System) (24202) (Paper - II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Questions 2 to 5 carry equal marks.

Q1) Solve any five of the following: [5]

- a) Define Intelligence.
- b) Define Interest.
- c) Define personality.
- d) Define mental health.
- e) What is mean by values?
- f) What is attitude?

Q2) a) Discuss the types of aptitude tests. [6]

OR

Elaborate Raven progressive matrices test of intelligence.

- b) Discuss the concept of work motivation and its importance in industrial setting. [4]

Q3) a) Elaborate 'Holand's RIASEC' model of career interest assessment. [6]

OR

Describe any Depression scale with their administration and interpretation process.

- b) Discuss the areas of marital adjustment. [4]

Q4) a) Discuss the needs of personality measurement in industrial context. [6]

OR

Discuss the characteristics of well-adjusted individual.

- b) Describe any one well-known test used in clinical setting. [4]

P.T.O.

Q5) Write short notes on any four of the following.

[10]

- a) Intelligence Quotient
- b) Organizational commitment
- c) Mental health
- d) Neuropsychological assessment
- e) Educational adjustment
- f) Factors affecting marital adjustment



Total No. of Questions : 5]

SEAT No. :

PD1551

[Total No. of Pages : 1

[6467]-426

S.Y. B.Sc.(Regular)

ENVIRONMENTAL SCIENCE

EVS-241: Biological Diversity and Its Conservation

(2019 Pattern) (Credit system) (Semester - IV) (24241) (Paper-I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q2 to Q5.
- 3) Question No 2 to 5 carry equal marks.

Q1) Answer any five of the following. [5]

- a) What is the significance of ecosystem diversity?
- b) Define species abundance.
- c) What is genetic variation?
- d) List any two threats to biodiversity.
- e) What is the role of JFM in biodiversity conservation?
- f) Define megadiversity countries.

Q2) a) Explain the major ecosystem types of the world with their characteristics. [6]

b) What are biodiversity hotspots? Explain their significance. [4]

Q3) a) Discuss various molecular techniques used in genetic diversity measurement. [6]

b) How do invasive species affect biodiversity. [4]

Q4) a) Describe the role of traditional knowledge in biodiversity conservation. [6]

b) What are ex-situ methods of Biodiversity conservation? [4]

Q5) Write short notes on any four of the following. [10]

- a) Importance of ecosystem in maintaining ecological balance. [2½]
- b) Concept of species evenness. [2½]
- c) Role of National Biodiversity strategy and action plan (NBSAP) [2½]
- d) BCCJ Bachao Andolan. [2½]
- e) EPA and its significance in Biodiversity conservation. [2½]
- f) Role of community participation in Biodiversity conservation. [2½]



Total No. of Questions : 5]

SEAT No. :

PD1552

[6467]-427

[Total No. of Pages : 2

Second Year B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

**EVS 242 : Environmental Pollution Control Technology
(2019 Pattern) (Credit System) (Semester-IV) (24242)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any Three questions from question No.2 to Q No.5.*
- 3) *Question No.2 to Q No.5 carry equal marks.*

Q1) Answer any 5 of the following. **[5]**

- a) Write any two objectives of primary wastewater treatment.
- b) Define the term “Noise pollution”.
- c) Name two major air pollutants.
- d) What is significance of pH in water quality monitoring?
- e) Define Plume behavior in air pollution.
- f) What is meant by sound insulation?

Q2) a) Explain the process of site & parameter selection during air monitoring. **[6]**

b) Explain different types of noise control techniques. **[4]**

Q3) a) Describe the method of water sampling and preservation techniques. **[6]**

b) Explain the process of infield sampling techniques used in soil monitoring. **[4]**

Q4) a) Explain the process of sedimentation in waste water treatment. **[6]**

b) Discuss the role of vegetation in controlling soil erosion. **[4]**

P.T.O.

Q5) Write short notes on any four of the following.

- | | |
|---|------|
| a) Activated sludge process | [2½] |
| b) Determination of age of tree | [2½] |
| c) Organic farming | [2½] |
| d) Biogas generation | [2½] |
| e) $\text{Pm}_{2.5}$ & Pm_{10} | [2½] |
| f) Noise Proof Wall | [2½] |



Total No. of Questions : 4]

SEAT No. :

PD1553

[Total No. of Pages : 1

[6467]-428

S.Y.B.Sc. (Regular)

DEFENCE & STRATEGIC STUDIES

DS-401: International Security

(2019 Pattern) (Semester - IV) (24231) (Credit System)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Define the following questions.

[5×1=5]

- a) Define National Interest?
- b) What is a Nation-State?
- c) What is Neutrality?
- d) What is National Power?
- e) Define Regionalism.

Q2) Write short notes on. (any two)

[10]

- a) Collective Security
- b) International Law
- c) Equal Security

Q3) Attempt the following questions. (any two)

[10]

- a) Explain the Balance of Power.
- b) Explain the International Law Nature and Scope.
- c) State the conceptual Framework of Global and Regional Environment.

Q4) Answer in details. (any one)

[10]

- a) Describe the Significance of Disarmament and Arms Control in maintaining Peace in Global and Regional Security.
- b) Explain the problems of world peace and security.



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 1

PD1554

[6467]-429

S.Y. B.Sc. (Regular)

DEFENCE AND STRATEGIC STUDIES

DS - 402 : Defence Economics

(2019 Pattern) (Semester-IV) (24232) (Credit System)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Define the following questions :

[5×1=5]

- a) Define Defence Budget.
- b) What is the Budget?
- c) Define the Central budget.
- d) Write types of budget.
- e) Define Security.

Q2) Write short notes on (any two) :

[10]

- a) ISRO
- b) DPSU
- c) Defence budget

Q3) Attempt the following questions (any two) :

[10]

- a) Explain the Parliamentary Budget of India.
- b) Describe the Basic Concepts of Defence Management.
- c) Explain the role of the Private Sector in Indian Defence.

Q4) Answer in details (any one) :

[10]

- a) Explain in detail the Defence and Development.
- b) Explain in detail the Nature and Scope of Military Management.



Total No. of Questions : 4]

SEAT No. :

PD-1555

[Total No. of Pages : 2

[6467] - 430

S.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-403: Defence Journalism

(2019 Pattern) (Semester - IV) (24233)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Define the following questions

[5 × 1 = 5]

- a) Define Digital media.
- b) What is Web media?
- c) Define broadcast media.
- d) Define Conflict Management.
- e) Define Security.

Q2) Write short notes on (any two)

[10]

- a) Role of Defence Journalism
- b) Laws of Media
- c) Defence Journalism

P.T.O.

Q3) Attempt the following questions (any two)

[10]

- a) Explain the Problems of Defence Journalists.
- b) State the Role of Defence Journalism in Conflict Management.
- c) State the Role of Defence Journalism in Peace Studies

Q4) Answer in details (any one)

[10]

- a) Discuss in detail the Role of Defence Journalism in National Security Studies.
- b) Discuss in detail the Problems, Prospects and Limitations faced by the Defence Journalists.



Total No. of Questions : 3]

SEAT No. :

PD1556

[Total No. of Pages : 1

[6467]-431

**S.Y.B.Sc.(Regular)/B.Sc.(Computer Science/Biotechnology/
Animation/Cyber & Digital Science)/B.C.A.**

LANGUAGE ENGLISH

AECC-IV-A : Language Communication - II

(Revised 2019 Pattern) (Semester - IV) (Credit System) (24321)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

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

Q1) Attempt any one of the following in about 150-200 words. [15]

- a) Describe the setting and atmosphere created in the poem 'stopping By woods on a snowy Evening' and how it contributes to the poem's mood and theme?
- b) Discuss the appropriateness of the title of the story 'My Lost Dollar'.

Q2) Attempt any two of the following in about 50-80 words. [10]

- a) Write a note on 'Content Writing in Digital Media Sites'.
- b) As a head of the debate club in your college, draft a notice for students to participate in an upcoming debate tournament.
- c) What are the points to remember while writing the minutes of the meeting?

Q3) Attempt any two of the following in about 50-80 words. [10]

- a) Discuss the importance of SWOT/C analysis for the growth of individuals as well as organizations.
- b) Write the strategies to achieve goals.
- c) Discuss the various phases of project management.



Total No. of Questions : 3]

SEAT No. :

PD1557

[Total No. of Pages : 1

[6467]-432
S.Y. B.Sc. (Regular)
MARATHI (मराठी)
AECC-IV-B : मराठी साहित्य
(2019 Pattern) (Credit System) (Semester-IV) (24331)

वेळ : 2 तास]

[एकूण गुण : 35

सूचना :- 1) सर्व प्रश्न सोडविणे आवश्यक आहेत.
2) उजवीकडील अंक प्रश्नांचे पूर्ण गुण दर्शावितात.

प्र.1) खालीलपैकी कोणत्याही एका विषयावर 300 शब्दांत निबंध लिहा.

[10]

- अ) जलप्रदूषण
- ब) मोबाईल: शाप की वरदान
- क) बेरोजगारी व युवक

प्र.2) खालीलपैकी तीन प्रश्नांची उत्तरे 100 शब्दांत लिहा.

[15]

- अ) 'कांचनमृग' या कथेचा आशय थोडक्यात लिहा.
- ब) 'अथेन्सचा प्लेग' मधील अब्दुलची व्यक्तिरेखा लिहा.
- क) आशा बगे यांच्या 'मारवा' कथेतील आबा या व्यक्तिरेखेचा परिचय करून द्या.
- ड) मानवी मनाच्या निर्मितीमागे उत्क्रांतीचा इतिहास आहे हे निरंजन घाटे यांच्या कथेच्या आधारे थोडक्यात स्पष्ट करा.
- इ) 'पुढल्या हाका' कथेतील विनय गुप्ते या व्यक्तिरेखेचे चित्रण करा.

प्र.3) खालीलपैकी एका प्रश्नाचे उत्तर 300 शब्दांत लिहा.

[10]

- अ) 'ओझ' या कथेतील दुष्काळग्रस्त ग्रामीण जीवनातील वास्तव विशद करा.
- ब) 'एक शहर मेले त्याची गोष्ट' ही कथा जैवविविधतेच्या संवर्धनाचा संदेश कशी देते त्याचा परामर्श घ्या.



[6467]-433

S.Y. B.Sc.

AECC - IV-C : हिंदी (Hindi)

हिंदी काव्य तथा कहानी साहित्य

(2019 Pattern) (CBCS) (Semester - IV) (24341)

पाठ्यपुस्तक – साहित्य संगम – संपा. प्रो.डॉ. सदानंद भोसले

समय : 2 घंटे]

[पूर्णांक : 35

सूचनाएँ : 1) सभी प्रश्न अनिवार्य हैं ।

2) दाहिनी ओर लिखे अंक प्रश्नों के पूर्णांक हैं ।

प्रश्न 1) निम्नलिखित में से किन्ही दो प्रश्नों के उत्तर लिखिए ।

[15]

अ) 'गीत – फरोश' कविता में कवि अपने गीत क्यों बेचना चाहते हैं?

ब) 'रोटी और संसद' कविता में भ्रष्ट प्रजातंत्र का वर्णन किस प्रकार किया है?

क) 'भूख' कविता का सारांश लिखिए ।

ड) 'मधुशाला' कविता के माध्यम से कवि ने सामाजिक एकता का संदेश किस प्रकार दिया है?

इ) 'झाँसी की रानी' की वीरता का परिचय दीजिए ।

प्रश्न 2) निम्नलिखित में से किन्ही दो प्रश्नों के उत्तर लिखिए ।

[15]

अ) 'पत्नी' कहानी का भावार्थ लिखिए ।

ब) 'बेटा' कहानी की कथावस्तु अपने शब्दों में लिखिए ।

क) 'शर्त' कहानी में वर्णित जातिगत विषमता स्पष्ट कीजिए ।

ड) 'ईश्वर का द्वंद्व' कहानी के शीर्षक की सार्थकता स्पष्ट कीजिए ।

इ) लेखक अशोक जगनानी को लेखन की प्रेरणा कैसे मिली?

प्रश्न 3) निम्नलिखित में से किसी एक प्रश्न का उत्तर लिखिए ।

[5]

अ) 'रोटी और संसद' कविता के शीर्षक सार्थकता पर प्रकाश डालिए ।

ब) 'पानाराम' का चरित्र – चित्रण कीजिए ।



Total No. of Questions : 4

SEAT No.

PD-1559

Total No. of Pages : 2

[6467]- 435

S.Y.B.Sc. (Semester-IV)

ARABIC

AECC:IV.D - Language: Arabic Functional

(24371) (Credit System) (2019 Pattern)

Total Marks :35]

[Time : 2 Hours

Instructions to the Candidates:

- 1) Attempt All questions.
- 2) Figures to the right side indicate full marks.

Q.1 Translate the following Passages into Urdu/Eng,(Any two) [10]

(الف) ذَالِكْ قَطٌ . هَذَا فَارٌ . ذَالِكْ كَلْبٌ . ذَالِكْ حِمَارٌ . هَذَا رَجُلٌ . هَذَا جَمَلٌ .
ذَالِكْ قِرْدٌ . أَنَا وَلَدٌ . أَنْتَ هَزِيلٌ . ذَالِكْ فَرَسٌ . هَذَا كِتَابٌ . هُوَ صَغِيرٌ .
أَنْتَ كَبِيرٌ . أَلَتَيْنِ حُلُو؟ هَذِهِ مَدْرَسَةٌ . الْمَاءُ كَثِيرٌ . الْآدَبُ وَاجِبٌ .
أَنْتَ طَوِيلٌ . هِيَ بِنْتُ .

(ب) الْقِرْدُ حَيَوَانٌ . الْعِلْمُ مُفِيدٌ . الْكِتَابُ عَرَبِيٌّ . اللَّعِبُ ضَرُورِيٌّ . الشَّجَرُ كَبِيرٌ .
الْإِسْلَامُ مُفِيدٌ . ذَالِكِ الطَّائِرُ بَبْغَاءٌ . الْقَلَمُ فِي الْجَيْبِ . هَذَا الْقَفْصُ لِغُرْدٍ
الْعَمَلُ ضَرُورِيٌّ لِلْعَالِمِ . الْبَيْتُ جَمِيلٌ . الْمُدَسُّ وَقِفٌ . أَنَا مَشْغُولٌ بِالْقِرَاءَةِ .

(ج) ذَالِكِ الْأَصِيصُ جَدِيدٌ . الْقَلَمُ لَازِمٌ لِلْكِتَابَةِ . الْأُسْتَاذُ جَالِسٌ عَلَى الْكُرْسِيِّ .
أَدَبُ الْأُسْتَاذِ وَاجِبٌ . الدَّرْسُ سَهْلٌ لِلْوَلَدِ . أَيْ شَيْءٍ فَوْقَ الطَّاوِلَةِ؟ فَضْلُ الشَّتَاءِ
بَارِدٌ . السَّمَكُ فِي الْمَاءِ . الْكُرْسِيُّ عَلَى الْأَرْضِ . الرَّجُلُ وَقِفٌ عَلَى الْأَرْضِ
الْوَلَدُ .

P.T.O.

Q.2 Translate and Explain the following poem “اَلدُّرُّ الْمَنْشُورُ”

into Urdu/Eng.

[10]

- (i) وَقُلْ مَنْ الْكَلَامِ مَا لَاقِ بِالْمَدَامِ
(ii) كَرَانِقِ الْأَشْعَارِ وَطَيِّبِ الْأَخْبَارِ
(iii) وَاتْرُكْ كَلَامَ السِّنْفَلَةِ وَالنَّكَتِ الْمُتَبَدَّلَةِ
(iv) وَلَا تَكُنْ مَلْخَا حَا وَاجْتَنِبِ الْمَزَا حَا
(v) فَكَثْرَةُ الْمُجُونِ نَوْعٌ مِنَ الْجُنُونِ

Q.3 Answer the following in Arabic only. (Any five)

[10]

- (i) هَلْ ذَالِكَ قَلَمٌ
(ii) هَلْ أَنْتَ صَغِيرٌ
(iii) أَيْنَ الْكِتَابُ
(iv) أَيُّ حَيَوَانٍ طَوِيلٌ
(v) مَا إِسْمُكَ
(vi) كَيْفَ الزَّهْرُ
(vii) أَيْنَ السَّمَكُ
(viii) مَنْ أَنْتَ
(ix) مَا فِي الْقَفْصِ

Q.4 Write the letter in Arabic to your mother.

[5]

OR

Write at least 10 numbers in Arabic.

✓ ✓ ✓ ✓

Total No. of Questions : 5]

SEAT No. :

PD1560

[6467]-436

[Total No. of Pages : 2

S.Y. B.Sc. (Vocational) (Regular)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

CHNA - 331 : Networking Fundamentals

(CBCS 2019 Pattern) (Semester - IV) (Paper - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.*
- 2) Solve any three questions from Q.2 to Q.5.*
- 3) Q.2 to Q.5 carry equal marks.*

Q1) Solve any five of the following :

[5×1=5]

- a) What is a server?
- b) What is the purpose of HTTP?
- c) Which is Better : coaxial cable or fiber optic cable?
- d) Define internet.
- e) Why the Computer Network so important?
- f) Write short note on Network.

Q2) a) i) Explain the Mesh Topology in short.

[2]

ii) Explain different types of Network.

[4]

b) What are the three roles for a windows server 2003 system in a Network?[4]

P.T.O.

Q3) a) i) What is DNS service? [2]

ii) What is difference between baseband & broadband transmission?[4]

b) Explain peer to peer networking. [4]

Q4) a) i) What is a Network interface card? [2]

ii) Define protocol. Explain the different types of protocols. [4]

b) Draw & explain server-client based network. [4]

Q5) Attempt any Four of the following (Short Notes) : [10]

a) FTP

b) Electronic Mail

c) Web services

d) Routers

e) UTP cable

f) Cable crimping



Total No. of Questions : 5]

SEAT No. :

PD1561

[Total No. of Pages : 2

[6467]-437

S.Y. B.Sc. (Regular) (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

CHNA-332 : Microprocessor & Interfacing - II

(CBCS 2019 Pattern) (Semester - IV) (Paper - IV) (24872)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q. No. 1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Question 2 to 5 carry equal marks.*

Q1) Solve any five questions of the following :

[5×1=5]

- a) What is Wi-Fi? Write applications of Wi-Fi.
- b) Write full form of HDMI.
- c) What is motherboard?
- d) What is function of sound card?
- e) List atleast two input devices.
- f) What are peripheral devices?

Q2) Answer the following :

- a)
 - i) What is mouse? Write any two types of mouse. **[2]**
 - ii) What is multimedia PC? State minimum required for multimedia PC. **[4]**
- b) Differentiate wired and wireless communication. **[4]**

Q3) Answer the following :

- a)
 - i) Write the storage capacity of CD & DVD. **[2]**
 - ii) Explain the function of display adapters in Computer displays. **[4]**
- b) Explain working of printer as an output device. **[4]**

P.T.O.

Q4) Answer the following :

- a) i) State two applications of card reader. [2]
ii) Explain the function of BIOS and the enhancement in Flash BIOS. [4]
- b) Compare asynchronous and synchronous serial data communication protocol. [4]

Q5) Write short notes on any four of the following : [10]

- a) Green PC
- b) Android operating system
- c) RFID system
- d) Speech synthesis
- e) Computer networks
- f) Remote desktop sharing tools



Total No. of Questions : 5]

SEAT No. :

PD1562

[6467]-438

[Total No. of Pages : 2

S.Y. B.Sc. (Regular) (Vocational)

BIOTECHNOLOGY

VBT - 221 : Genetic Engineering

(2019 Pattern) (Semester-IV) (24571) (Paper - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Questions 2 to 5 carry equal marks.*

Q1) Solve any five of the following : **[5]**

- a) Define r-DNA.
- b) Name the selectable markers of pBR322 vector.
- c) Enlist any 2 types of PCR.
- d) Define expression vector.
- e) Name the enzymatic method of DNA sequencing.
- f) On what basis do proteins get separated in agarose gel electrophoresis?

Q2) a) Answer any two of the following : **[6]**

- i) Explain any three types of plasmids with examples.
 - ii) Describe the antisense RNA technology.
 - iii) Give the role of dimethyl sulphate, piperidine and hydrazine in Maxam Gilbert method of DNA sequencing.
- b) Describe electroporation technique in detail. **[4]**

OR

Explain any two DNA modifying enzymes in detail. **[4]**

P.T.O.

Q3) a) Answer any one of the following : [6]

- i) Explain YAC vector in detail.
- ii) Describe the basic steps involved in gene cloning.
- iii) Explain pyrosequencing method in detail.

b) Explain the procedure of Western blotting. [4]

OR

Write a short note on “Nomenclature of restriction enzymes”. [4]

Q4) a) Answer any two of the following : [6]

- i) Give the role of DNA topoisomerases during DNA replication and after DNA replication.
- ii) Explain any 3 features of cosmids.
- iii) Write a short note on biopesticides.

b) Explain any one non-radioactive labelling method in detail. [4]

OR

Describe the basic steps involved in PCR. [4]

Q5) Write short notes on any four of the following : [10]

- a) Applications of PCR.
- b) Cloning vectors.
- c) Role of dideoxyribonucleotide in Sanger’s method of DNA Sequencing.
- d) Applications of Southern blotting.
- e) Applications of r-DNA technology.
- f) Blunt end DNA fragments and sticky end DNA fragments.



Total No. of Questions : 5]

SEAT No. :

PD-1563

[Total No. of Pages : 2

[6467]-439

S.Y.B.Sc. (Voc.)

BIOTECHNOLOGY

VBt-222 : Bioinformatics

(2019 Pattern) (CBCS) (Semester - IV) (24572)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) Q.1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Questions 2 to 5 carry equal marks.

Q1) Answer any five of the following :

[5]

- a) Define Homologue.
- b) What is SCOP?
- c) What are scoring matrices?
- d) Give full form of BLAST.
- e) Give scope of databases.
- f) Define Prosite.

Q2) a) Answer any two of the following :

[6]

- i) Comment on Brief History of Bioinformatics.
- ii) What is BLOSUM series? Give any Four applications.
- iii) What is Gene Bank? Explain in detail its concept.

b) Answer any one of the following :

[4]

- i) What are servers? Add a note on servers by using NAR database.
- ii) Give any three applications of each structural and Derived database.

P.T.O.

Q3) a) Answer any two of the following : [6]

- i) What is SWISSPORT? Give any application.
- ii) Comment on Primary and Secondary database.
- iii) What is ENTREZ? Give application.

b) Answer any one of the following : [4]

- i) Explain in detail sequence identity.
- ii) Distinguish between BLAST & FASTA.

Q4) a) Answer any two of the following : [6]

- i) Give your views on PubMed as literature data base.
- ii) Give scope of Bioinformatics and comment on its application.
- iii) Comment on Sangers method as specialized database.

b) Answer any one of the following : [4]

- i) How extractions of knowledge from database from animal and infections disease done?
- ii) What are servers? Add a note on servers.

Q5) Write short notes on (Any four): [10]

- a) DDBJ.
- b) Paralogues.
- c) Protein sequences.
- d) EMBL.
- e) PIR-PHD.



Total No. of Questions : 5]

SEAT No. :

PD-1564

[Total No. of Pages : 2

[6467]-440

S.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

ST - 2.4 : Vegetable Seed Production

(2019 Pattern) (Semester - IV)(2 Credits)(Paper - III)(24891)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any Three questions from Question No. 2 to Question No. 5.*
- 3) *Question No. 2 to Question No. 5 carry equal marks.*

Q1) Solve any Five of the following : **[5]**

- a) Define Nursery Management.
- b) Enlist types of Pollination.
- c) Give the isolation distance for Onion.
- d) Write any two control measures for Fruit borer in Brinjal.
- e) What is Roughing?
- f) What is the intervarital hybridization?

Q2) a) Write the procedure of hybrid seed production in Tomato. **[6]**

b) Explain Hi-tech nursery. **[4]**

Q3) a) Describe the garden for vegetable processing. **[6]**

b) Explain the advantages and disadvantages of pure line selection. **[4]**

P.T.O.

- Q4)** a) Write Vegetable crops based on plant part used for consumption. [6]
b) Give the procedure for hybridization. [4]

Q5) Write short notes on any FOUR of the following: [10]

- a) Plant Protection
- b) Inter cultural practices in Okra.
- c) Objectives in pure line selection.
- d) Explain flat beds.
- e) Types of emasculation.
- f) Precaution in raising of healthy seedlings.



Total No. of Questions : 5]

SEAT No. :

PD-1565

[Total No. of Pages : 2

[6467]-441

S.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

ST 2.5 : Seed Quality Control (Paper - IV)

(2019 Pattern) (Semester - IV) (24892) (Credits 2) (CBCS)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any Three questions from Q. No.2 to Q. No.5.
- 3) Q. 2 to 5 carry equal marks.

Q1) Solve any five the following :

[5]

- a) Define certified seed.
- b) Define control legislation.
- c) Write any two penalties in seed law enforcement.
- d) Give any two duties of seed inspector.
- e) Define seed quality.
- f) Write a names of any two statutory bodies in India.

Q2) a) Comment on central seed testing laboratories.

[6]

b) Explain organic manures and Biopesticides.

[4]

Q3) a) Write the general seed certification standard.

[6]

b) Explain classes of seed.

[4]

Q4) a) Explain indetail general principles of field inspection.

[6]

b) Explain offences and penalties in seed law enforecement.

[4]

P.T.O.

Q5) Write short notes on any four of the following :

[10]

- a) Central seed certification board.
- b) Stages of field inspection.
- c) Organization of seed certification.
- d) Organic farming.
- e) Objectives of field inspection.
- f) Types of seed legislation.



Total No. of Questions : 5]

SEAT No. :

PD-1566

[Total No. of Pages : 2

[6467] - 442

S.Y. B.Sc. (Vocational Paper - III)

INDUSTRIAL MICROBIOLOGY

**Voc-IND-IMB-221: Microbial Fermentation and Downstream Processing
(CBCS) (2019 Pattern) (Semester - IV)**

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any three questions from Q. 2 to Q. 5.*

Q1) Solve any five of the following :

[5 × 1 = 5]

- a) What is meant by 'Salting out of protein'?
- b) What is downstream processing?
- c) What is SCP? State an example.
- d) What is the principle of solvent precipitation?
- e) During Streptomycin production _____ serves as a seed culture.
- f) State an example of a bioinoculant.

Q2) a) Attempt any three of the following :

[6]

- i) Explain in brief principle & working of affinity chromatography using a diagram.
- ii) Enlist five commercial products and write the names of respective microorganism used for production.
- iii) What is centrifugation? Where is it used in downstream processing?
- iv) Explain in brief principle & working of Ion exchange chromatography using a diagram

b) Write a short note on dialysis

[4]

P.T.O.

Q3)a) Attempt any three of the following : [6]

- i) Explain process of Vit B12 production in brief.
- ii) Draw a flowchart for organic acid production
- iii) Write a short note on Solvent precipitation.
- iv) Explain production of cheese in brief.

b) Write a short note on cell disruption techniques. [4]

Q4) a) Answer any three of the following : [6]

- i) Assuming your product is the biomass draw a processing chart with appropriate reasoning.
- ii) Enlist techniques used to characterize the product.
- iii) Draw a well labelled diagram of Gel permeation chromatography.
- iv) Write a detailed account of streptomycin production

b) Write a short note on Aeration and Agitation [4]

Q5) Write short notes on any four of the following : [10]

- a) FTIR
- b) MALDI
- c) Formulation of product
- d) Packaging and sales of product
- e) Rotary vacuum filter
- f) Sedimentation as a method of separation



Total No. of Questions : 5]

SEAT No. :

PD-1567

[Total No. of Pages : 2

[6467]-443

S.Y. B.Sc.

INDUSTRIAL MICROBIOLOGY

VOC - IND - IMB - 222 : Quality Assurance in Industrial Product

(CBCS) (2019 Pattern) (Semester - IV) (24822)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

- 1) *Q.1 is compulsory.*
- 2) *Solve any three questions from Q.2 to Q.5.*
- 3) *Question No.2 to 5 carry equal marks.*

Q1) Solve any Five of the following : [5]

- a) Standards of production and use of single cell protein is governed by which agency?
- b) Enlist the quality assurance tests recommended for tooth paste.
- c) USP stands for _____.
- d) What is toxicity?
- e) Explain the significance of detecting pyrogen in a product.
- f) Explain the role of FPO.

Q2) a) Attempt any three of the following : [6]

- i) Enlist all controls necessary in sterility testing.
 - ii) Describe the method of performing bioassay of vitamins using a suitable example.
 - iii) Describe in-vitro tests of carcinogenic substances.
 - iv) Discuss about shelf life of antibiotics.
- b) Write the significance of GMP. [4]

P.T.O.

Q3) a) Attempt any three of the following : [6]

- i) Explain the role of WHO in pharmaceutical industries.
 - ii) Which quality assurance tests are to be performed for testing quality of solvent ethanol?
 - iii) Draw neat and labeled flow diagram for the process of sterility testing of a product.
 - iv) Enlist quality assurance tests recommended for testing quality of cheese?
- b) Explain the concept of IP and discuss its necessity. [4]

Q4) a) Attempt any three of the following : [6]

- i) Discuss the significance of allergen testing.
 - ii) Explain the difference between ISO standard and ISI standards.
 - iii) Explain the importance of sterility testing of pharmaceuticals.
 - iv) Elucidate the process of performing bioassays.
- b) what are AGMARK standards? Explain their role in industries. [4]

Q5) Write short notes on any four of the following : [10]

- a) WHO's role in pharmaceutical CGMP.
- b) Standards for dairy products.
- c) Carcinogenicity testing of lotions.
- d) BP.
- e) Standards for bioinoculants.
- f) Product quality tests in monographs.



Total No. of Questions : 5]

SEAT No. :

PD-1568

[Total No. of Pages : 4

[6467]-446

S.Y. B.A./S.Y.B.Com./B.Sc-(All courses)

ENVIRONMENTAL SCIENCE

AECC : Environmental Awareness - III

(2019 Pattern) (Semester - IV)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any Three questions from Question No. 2 to Question No. 5.
- 3) Question No. 2 to Question No. 5 carry equal marks.

Q1) Attempt any Five of the following :

- a) What is mean by Environmental pollution? [1]
- b) What is mean by particulate matter? [1]
- c) What is mean by SO_x? [1]
- d) Define persistant pollutants? [1]
- e) Give the full form of MOEFCC [1]
- f) Enlist primary Air Pollutants? [1]

Q2) Answer the following :

- a) What is Water Pollution? Explain in detail sources and Effects of Water Pollution? [6]
- b) What is Nuclear Hazard? Discuss Effect of Nuclear Hazard on Human Health? [4]

Q3) Answer the following :

- a) What is Environmental law? Explain in brief wildlife (Protection) Act 1972? [6]
- b) What is the role of Environmental legislation in Environmental Protection? [4]

P.T.O.

Q4) Answer the following :

- a) What is Solid Waste Management? Explain control measures of Solid Waste Management? [6]
- b) What is Global Warming? Explain effects of Global Warming on Environment? [4]

Q5) Write a short note on Any Four of the following : [10]

- a) Environmental Ethics [2½]
- b) Environmental communication and Public awareness [2½]
- c) Human population Growth [2½]
- d) Acid Rain [2½]
- e) Causes of Soil Pollution [2½]
- f) Industrial Waste Management [2½]



PD-1568

[6467]-446

S.Y. B.A./S.Y.B.Com./B.Sc-(All courses)

ENVIRONMENTAL SCIENCE

AECC : Environmental Awareness - III

(2019 Pattern) (Semester - IV)

(मराठी रूपांतर)

वेळ : 2 तास]

[एकूण गुण : 35

- सूचना : 1) प्रश्न क्र. 1 अनिवार्य आहे.
2) प्रश्न क्र. 2 ते प्रश्न क्र. 5 मध्ये कोणतेही तीन प्रश्न सोडवा
3) प्रश्न क्र. 2 ते प्रश्न क्र. 5 समान गुण आहेत.

-
- प्रश्न 1) खालीलपैकी कोणतेही पाच प्रश्न लिहा.
- अ) पर्यावरणीय प्रदुषण म्हणजे काय? [1]
ब) “पर्टिक्युलेट मॅटर” म्हणजे काय? [1]
क) SO_x म्हणजे काय? [1]
ड) सतत प्रदुषक परिभाषित करा? [1]
इ) MOEFCC चे पूर्ण रूप लिहा? [1]
फ) प्राथमिक वायु प्रदुषकांची यादी करा. [1]
- प्रश्न 2) खालील प्रश्नांची उत्तरे द्या.
- अ) जल प्रदुषण म्हणजे काय? जल प्रदुषणाचे स्रोत आणि परिणाम स्पष्ट करा? [6]
ब) आण्विक धोका काय आहे? आण्विक धोक्याचे मानवि आरोग्यावर होणारे परिणाम स्पष्ट करा? [4]
- प्रश्न 3) खालील प्रश्नांची उत्तरे द्या.
- अ) पर्यावरण कायदा म्हणजे काय? वन्यजीव संरक्षण कायदा 1972 सविस्तर स्पष्ट करा? [6]
ब) पर्यावरण संरक्षणात पर्यावरण कायद्याची भूमिका काय आहे? [4]

प्रश्न 4) खालील प्रश्नांची उत्तरे द्या.

अ) घनकचरा व्यवस्थापण म्हणजे काय? घनकचरा व्यवस्थापणाचे नियंत्रण आणि उपाय स्पष्ट करा. [6]

ब) जागतीक तापमान वाढ म्हणजे काय? जागतीक तापमानवाढीचे पर्यावरणावर होणारे परीणाम स्पष्ट करा? [4]

प्रश्न 5) खालीलपैकी कोणत्याही चारवर टीपा लिहा. [10]

अ) पर्यावरण नैतिकता [2½]

ब) पर्यावरण संप्रेषण आणि जनजागृती [2½]

क) मानवी लोकसंख्यावाढ [2½]

ड) आम्लवर्षा [2½]

इ) मृदा प्रदुषणाचे कारणे [2½]

फ) औद्योगिक कचरा व्यवस्थापण [2½]

