Total No. of Questions : 4]

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S.Y. B.Sc.

MATHEMATICS

MT - 241 : Linear Algebra (Paper-I)

(2019 Pattern) (Semester - IV) (CBCS) (Regular) (24111)

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 × 1 = 5]**

a) Find rank of matrix $A=\begin{bmatrix}1 & 0 & -2\\ 2 & 1 & 1\\ 2 & 0 & -4\end{bmatrix}$.

b) Write standard basis of P_3, set of polynomials of degree less than or equal to 3.

c) Determine whether the set {(1,2), (1,0), (0,–2)} is linearly depedent in $\mathbb{R}^2$.

d) Write any two non trivial subspaces of $\mathbb{R}^2$.

e) Find rank of a 6×7 matrix whose nullity is 4.

f) Let $T:\mathbb{R}^2\to\mathbb{R}^2$ be a linear transformation defined by $T(x,y)=(2x,3y)$ then find standard matrix of T.

g) Let $T:\mathbb{R}^3\to\mathbb{R}^3$ be the linear transformation given by $T(x, y, z) = (x + y – z, x –2y + z, –2x – 2y + 2z)$ Determine whether u = (1, 2, 3) is in ker (T).

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

i) Prove that a non empty subset W of a vector space V is a subspace of V if and only if $\alpha w_1+\beta w_2\in W$ for any scalars α, β and $w_1, w_2 \in$ W.

ii) A subset S in a vector space V containing two or more vectors is linearly dependent if only if atleast one vector is expressible as the linear combination of remaining.

P.T.O.

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

i) Solve the following system by Gauss-Jordan method

$$x-3y+5z=-9$$
$$2x-y-3z=19$$
$$3x+y+4z=-13$$

ii) Determine the values of 'a' for which the system has no solution, exactly one solution or infinitely many solutions.

$$x+2y-3z=4$$
$$3x-y+5z=2$$
$$4x+y+\left(a^2-14\right)z=a+2$$

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

i) Let V be a n - dimensional vector sapce ($n \geq 1$) then prove that any subset of V with 'n' elements which spans V is a basis.

ii) If W is subspace of a finitie dimensional vector space V then prove that dim (W) $\leq$ dim (V).

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

i) Find the co-ordinate vector of $p = 2 - 3x + 4x^2$ relative to the basis $B=\left\{p_1=1+x+x^2, p_2=x+x^2, p_3=x^2\right\}$.

ii) Determine the basis & dimension of row space of

$$A=\begin{bmatrix}1 & 2 & 1 & 1\\ 2 & -3 & 7 & 9\\ 1 & 4 & -2 & -1\end{bmatrix}$$

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

i) Let the linear transformation $T:V\to W$ be injective and $\left\{v_1,v_2,....v_k\right\}$ be a set of linearly independent vectors in V then prove that $\left\{T\left(v_1\right),T\left(v_2\right)...T\left(v_k\right)\right\}$ is linearly independent.

ii) Define range of a linear transformation. If T:V$\rightarrow$W is linear transformation then prove that the range of T is subspace of W.

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

i) Find the basis for kernel of linear transformation $T:\mathbb{R}^3 \rightarrow \mathbb{R}^3$ given by $T(x,y,z)=(x+y+2z, x+z, 2x+y+3z)$.

ii) Find domain and co-domain of T_2oT_1. Also find formula for T_2oT_1 if $T_1(x, y, z) = (x - y , y + z, x - z)$ and $T_2(x, y, z) = (0, x + y + z)$.

Total No. of Questions : 4]

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S.Y. B.Sc.

MATHEMATICS

MT-242 (A) : Vector Calculus

(2019 CBCS Pattern) (Semester-IV) (Regular) (24112A) (Paper-II)

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 $\overline{F}(t)=\left(\frac{t^2-1}{t-1}\right)\overline{i}+t^3\overline{j}$, Find $\lim_{t\to -1}\overline{f}(t)$.

b) If $\overline{r}(t)=(t+1)\overline{i}+(t^2-1)\overline{j}$ is position of particle in *xy* - plane at time '*t*', then find particle's velocity at $t = 1$.

c) Evaluate $\int_0^1 (t\,\overline{i}+t^2\,\overline{j})\,dt$

d) Give parametric representation for portion of plane $7x + 3y + 4z = 15$ that lies in the first octant.

e) Find k-component of curl $\overline{F}$ for the vector field $\overline{F}=(x^2-y)\overline{i}+y^2\overline{j}$ on the plane.

f) State Divergence Theorem in three dimensions.

g) Find curl of vector field $\overline{F}(x,y,z)=(x^2-yx)\overline{i}+(y^2-xy)\overline{j}$

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

i) If $\overline{u}(t), \overline{v}(t)$ are differentiable vector functions then prove that

$$\frac{d}{dt}[\overline{u}(t)\times\overline{v}(t)]=\overline{u}(t)\times\frac{d}{dt}\overline{v}(t)+\frac{d}{dt}\overline{u}(t)\times\overline{v}(t).$$

P.T.O.

ii) Define line integral of $\bar{F}$ along a smooth curve C and evaluate the line integral of $\bar{F} = z\bar{i} + xy\,\bar{j} - y^2\,\bar{k}$ along the curve C given by $\bar{r}(t) = t^2\bar{i} + t\,\bar{j} + \sqrt{t}\,\bar{k}$, $0 \le t \le 1$.

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

i) Find arclength along the curve,

$$\bar{r}(t) = (t\cos t)\bar{i} + (t\sin t)\,\bar{j} + \frac{2\sqrt{2}}{3}\,t^{3/2}\,\bar{k}$$ from $t = 0$ to $t = \pi$.

ii) Evaluate $\iint_S y\,d\sigma$, where S is the portion of cylinder $x^2 + y^2 = 3$ that lies between $z = 0$ and $z = 6$

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

i) Let C be smooth curve joining the point A to point B in the plane or space and parametrized by $\bar{r}(t)$. Let f be differentiable function with continuous gradient vector $\bar{F} = \nabla f$ on domain D containing C. Then prove that $\int_C \bar{F}.d\bar{r} = f(B) - f(A)$.

ii) Give parametrization of cone $z = \sqrt{x^2 + y^2}$, $0 \le z \le 1$ and find surface area of cone $z = \sqrt{x^2 + y^2}$, $0 \le z \le 1$.

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

i) Find $\bar{f}(2)$, if $\bar{f}(t) = (t^2 + 1)\bar{i} + (4t - 3)\bar{j} + \left(2t^2 - \frac{1}{2}t\right)\bar{k}$ is continuous at $t = 2$.

ii) Evaluate $\iint_S 6xy\,ds$, where S is portion of plane $x + y + z = 1$ that lies in first octant and is in front of YZ-plane.

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

i) Define conservative vector field and show that $\bar{F}=2x\,\bar{i}+3y\,\bar{j}+4z\,\bar{k}$ is conservative vector field. Find scalar potential function ϕ such that $\bar{F}=\nabla\phi$.

ii) State stoke's Theorem and evaluate $\iint_S = \nabla\times\bar{F}\cdot\bar{n}\,d\sigma$ for the vector field $\bar{F}= y\,\bar{i}-x\,\bar{j}$, over the hemisphere, S : $x^2 + y^2 + z^2 = 9$, $z \geq 0$.

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

i) Verify $\oint_C M\,dx+N\,dy=\iint_R\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)dx\,dy$ for the vector field $\bar{F}=-y\,\bar{i}+x\,\bar{j}$. The region R : $x^2 + y^2 \leq a^2$ and its boundary is circle, C : $\bar{r}(t)=(a\cos t)\bar{i}+(a\sin t)\bar{j}$, $0 \leq t \leq 2\pi$.

ii) Find the flux of $\bar{F}=xy\,\bar{i}+yz\,\bar{j}+xz\,\bar{k}$ outward through the surface of cube cut from first octant by the planes $x = 1$, $y = 1$, $z = 1$.

Total No. of Questions : 4]

SEAT No. : ____

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S.Y. B.Sc. (Regular)

MATHEMATICS

MT-242 (B) : Dynamical Systems

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

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) Suppose matrix $A = \begin{bmatrix} 1 & 4 & 0 \\ 0 & -2 & 5 \\ 0 & 0 & 3 \end{bmatrix}$. Is matrix A diagonalizable? Justify your answer.

b) What do you mean by Linearly independent or dependent vectors in the plane?

c) Write the following second order differential equation as a system of first order differential equation.

$2x''(t) - 3x'(t) + 4x(t) = 0.$

d) Find all equillibrium points of the system $X' = \begin{bmatrix} 2 & 3 \\ 4 & 7 \end{bmatrix} X.$

e) Without finding the eigenvalues of the matrix $A = \begin{bmatrix} 5 & -3 \\ -8 & -6 \end{bmatrix}$, determine the nature of the eigenvalues.

f) Write second order equation $X'' - 7X' = 0$ in the form of $X' = AX$.

g) If 2 and 3 are eigenvalues of matrix A, then what will be the eigenvalues of matrix A^3?

P.T.O.

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

i) If A is n×n matrix which is diagonalizable then prove that A has n linearly independent eigenvectors.

ii) Suppose V = (v_1, v_2) and $W = (w_1, w_2) \in R^2$, then show that V and W are linearly independent vectors if and only if $\det \begin{pmatrix} v_1 & w_1 \\ v_2 & w_2 \end{pmatrix} \neq 0$.

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

i) Find the basis for the eigenspace of the matrix $A = \begin{bmatrix} -1 & 3 \\ 2 & 0 \end{bmatrix}$.

ii) Show that the matrix A is diagonalizable where $A = \begin{bmatrix} -1 & 4 & -2 \\ -3 & 4 & 0 \\ -3 & 1 & 3 \end{bmatrix}$.

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

i) Matrix A is a non-zero matrix, then prove that a planar linear system X'=AX has

1) Unique equilibrium point (0, 0) if det (A) ≠ 0

2) a straight line of equilibrium points if det (A)=0

ii) Prove that the 2×2 matrix T is invertible if and only if det (T) ≠ 0.

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

i) Find the general solution of the system X' = AX, where $A = \begin{bmatrix} -1 & 0 \\ 0 & 2 \end{bmatrix}$.

ii) Solve and sketch it's phase portrait of the system X' = AX, where $A = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$.

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

i) If A is 2×2 matrix with eigenvalues λ_1 and λ_2 then prove that trace of A is $\lambda_1 + \lambda_2$ and determinant of A is $\lambda_1 \cdot \lambda_2$

ii) Show that $\frac{d}{dt}(\exp(t\,A)) = A \cdot \exp(t\,A)$

$= \exp(tA) \cdot A$

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

i) Find the exponential form of the matrix A, where $A = \begin{bmatrix} 0 & 1 & 2 \\ 0 & 0 & 3 \\ 0 & 0 & 0 \end{bmatrix}$.

ii) Find the matrix T that puts the matrix A into canonical form, were

$A = \begin{bmatrix} -1 & 1 \\ 1 & -1 \end{bmatrix}$

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Total No. of Questions : 5]

SEAT No. : ____

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S.Y. B.Sc.

PHYSICS - I

PHY-241 : Oscillations, Waves and Sound

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

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) ***Question 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) Define linear simple harmonic motion.

b) What is log decrement?

c) What are damped oscillations?

d) The equation of forced oscillations of an oscillator is given as

$$4\left(\frac{d^2x}{dt^2}\right)+2\left(\frac{dx}{dt}\right)+144x=25\sin qt$$

Determine the resonant frequency at which velocity resonance takes place.

e) Calculate the change in intensity level when the intensity of sound increases by 1000 times the original intensity.

f) Define reverberation.

P.T.O.

Q2) a) Set up differential equation for the damped oscillation in the form

$$m\left(\frac{d^2x}{dt^2}\right)+R\left(\frac{dx}{dt}\right)+kx=0$$ **[6]**

OR

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

b) Explain optical method to obtain Lissajous figures. **[4]**

Q3) a) Prove that the velocity of transverse waves over a string of linear density μ is $C=\sqrt{\frac{T}{\mu}}$ where T is tension **[6]**

OR

Prove the relation $\frac{d\lambda}{\lambda}=\frac{C_s}{C}$ where dλ is the change in wavelength and C_s is velocity of source.

b) A capacitor of 0.4μF, an inductor of 80 mH and a resistor of 1000 Ohms are joined in series. Can the electrical circuit be oscillatory? **[4]**

Q4) a) Explain stable, unstable and neutral equilibrium in detail **[6]**

OR

Prove that the amplitude A and the phase ϕ in forced oscillations are given by

i) $A=\frac{f_0}{\sqrt{(k-mq^2)^2+R^2q^2}}$

ii) $\tan\phi=\frac{qR}{k-mq^2}$

Where symbols have their usual meaning.

b) The equation of longitudinal wave motion is expressed by $l = l_0$ sin $2\pi(0.2 \times -66t)$. **[4]**

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

a) Pitch of Sound

b) Lissajous Figures

c) Critically damped motion

d) Barton's Pendulum

e) P-waves

f) RADAR

□□□

Total No. of Questions: 5]

SEAT No. :

P7333

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[6154]-55
S.Y. B.Sc.
PHYSICS (Regular)
PHY-242: OPTICS (Paper-II)
(CBCS 2019 Pattern) (Semester-IV) (24122)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question no. 1 is compulsory.***
2) ***Solve any Three questions from Question 2 to Question 5.***
3) ***Questions No. 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) Define lens

b) Define Aberration

c) Define linear magnification of lens

d) What is mean by Rayleight's criterion?

e) The polarizing angle for air and transporent material is 60° calculate refractive index of material

f) State law of malus

Q2) Answer the following.

a) Derive lens maker's formula for thin lens. **[6]**

OR

Derive $D=2\mu t \cos r$ for interference due to refracted (transmitted) light obtain the condition for maxima and miniam .

b) Obtain an expression for magnifying power for simple microscope **[4]**

P.T.O.

Q3) Answer the following.

a) Prove that for a combination of two thin lenses of Focal lengths If f_1 and f_2 separated by distance *x*, the focal length of combination in given by

$$F = \frac{f_1 f_2}{f_1 + f_2 - x}$$ **[6]**

OR

Give the theory of plane transmission grating. Discuss the condition under which principle maxima will occur.

b) Two thin lenses of the same material having focal length f_1 and f_2 are separated by a distance *x*. The equivalent focal length of the combination is 40 cm and the combination satisfies the condition for no cromatic aberation and minimum spherical aberration find the value of f_1, f_2 and *x*. **[4]**

Q4) Answer the following

a) Define chromatic aberration. Show that longitudinal chromatic aberration is equal to product of dispersive power and mean focal length. **[6]**

OR

Explain the stokes treatment of the phase change on reflection of light.

b) A parallel beam of monochromatic light is incident normaly on a grating having 5905 lines per cm. If the second order spectral line is observed to be deviated through 30°, Find the wavelength of light used. **[4]**

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

a) Fresnels diffraction
b) Write a short note on Distortion
c) Cardinal points
d) Positive crystal
e) Application of Newton's (any one)
f) Concave lens and its types

Total No. of Questions : 5]

SEAT No. :

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S.Y. B.Sc.

CHEMISTRY

CH-401 : Physical and Analytical Chemistry

(2019 Pattern) (CBCS) (Semester - IV) (24131) (Paper - I)

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.***
4) ***Use of calculators is allowed.***

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

a) What is mean by components?

b) Define Ideal Solutions.

c) The transmittance of solution of a substance was found to be 70%. Calculate absorbance.

d) The length of conductivity cell is 1.82cm & area of cross section is $3.5cm^2$. Calculate cell constant of the cell.

e) What is elution?

f) Define consolute temperature.

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

i) What is phase rule? Explain different terms involved in it.

ii) State the Henry's Law. Give it's applications.

iii) What is cell constant? Give it's units & how cell constant is determined.

b) Discuss the construction & working of phototube. **[4]**

P.T.O.

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

i) Explain the method of separation of amino acids by Ion exchange chromatography.

ii) Explain the phase diagram of CO_2 system.

iii) Explain the term critical solution temperature with suitable example.

b) Attempt the following : **[4]**

i) Calculate the molar absorptivity of 1.85×10^{-5}m solution having 0.30 absorbance when placed in 1cm path length cuvette.

ii) The resistance of 0.025N KCl solution at 26°C is 300 ohm. Calculate conductance of the solution.

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

i) Derive the expression of phase rule.

ii) Explain the size exclusion chromatography in detail.

iii) Discuss with the help of neat diagram the effect of temperature on solubilities of Nicotine-water system.

b) The resistance of conductivity cell filled with 0.02N solution of an electrolyte is 100 ohm at 25°C. Calculate specific conductance and equivalent conductance, if cell constant is 2.06 cm^{-1}. **[4]**

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

a) Partial molar free energy.

b) Effect of Impurity on critical solution temperature of partially miscible liquids.

c) Photovoltaic cell.

d) Separation of Lanthanides by Ion-Exchange Chromatography.

e) Stationary and mobile phases used in column Chromatography.

f) Conductometric titrations of strong acid and weak base.

Total No. of Questions: 5]

SEAT No. :

P7335

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[6154]-57
S.Y. B.Sc.
CHEMISTRY (Regular)
CH402 : Inorganic and Organic Chemistry (Paper-II)
(2019 CBCS Pattern) (Semester-IV) (24132)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question no. 1 is compulsory.***
2) ***Solve any Three questions from Question 2 to Question 5.***
3) ***Questions No. 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***

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

a) Define Geometrical isomerism.

b) What is the hybridisation of $[Ni(CN)_4]^{2-}$?

c) Give spin only formula to measure magnetic moment.

d) What is iodoform test?

e) What is the action of ammonia on acetic anhydride?

f) What is Hinsburge test?

Q2) a) Attempt any two of the following. **[6]**

i) Explain ionization isomerism with suitable example

ii) State assumptions of CFT

iii) Explain the terms strong field and weak field

b) Attempt the following **[4]**

i) Draw the chair conformation of trans 1,2 dimethyl cyclohexane comment on their stability

ii) Explain any two factors affecting the stability of conformation.

P.T.O.

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

i) Give any three electrophilic substitution reactions of aniline

ii) Explain Connizzaro reaction with suitable examples

iii) Write note on Aldol condensation

b) Explain the splitting of d-orbitals in tetrahedra complex. **[4]**

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

i) Mention the type of hybridisation and geometry of $[Ni(CO)_4]$, $[Fe(CN)_6]^{3-}$ and $[Cr(CO)_6]$.

ii) Explain perkin condensation

iii) Write note on Reformotsky Reaction

b) Write short note on spectrochemical series **[4]**

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

a) Find the CF SE in d^4 system weak Field complex

b) What is the hybridisation and geometry of $[MnCl_4]^{2-}$ and calculate magnetic moment value [At.No. Mn=25]

c) Discuss the d-orbital splitting in octahedral complexes with suitable example

d) Predict the products

$$\text{Aniline} \xrightarrow[0°C]{NaNO_2/KCl} (A) \xrightarrow{CuCl} (B)$$

e) Draw chair conformation of cyclohexane indicating axial and equitorial hydrogen atoms

f) Identify the product 'A' and 'B' and rewrite the reaction

$$CH_3-\overset{\overset{O}{\|}}{C}-OH \xrightarrow{PCl5} (A) \xrightarrow{C_2H_5OH} (B)$$

Total No. of Questions : 5]

SEAT No. : ____

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S.Y. B.Sc. (Regular)

BOTANY

BO-241 Plant Anatomy and Embryology

(2019 Pattern) (CBCS) (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) What is epidermis?

b) Write any two applications of Anatomy in Taxonomy.

c) Define Embryology

d) What is self pollination?

e) Define Anatomy

f) What is bitegmic ovule?

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

b) Describe the structure of Dicot embryo. **[4]**

Q3) a) Describe any three types of ovules. **[6]**

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

P.T.O.

Q4) a) Explain any three types of microspore tetrads. **[6]**

b) Describe the structure of typical stomata. **[4]**

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

a) Inextensibility

b) Structure and functions of phloem

c) Periderm

d) Chalazogamy

e) Secretory tapetum

f) Significance of double fertilization.

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Total No. of Questions : 5]

SEAT No. : ____

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[6154]-59
S.Y. B.Sc.
BOTANY - II
BO - 242 : Plant Biotechnology
(2019 Pattern) (CBCS) (Semester - IV) (Paper - II) (24142)

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) ***Question No.2 to question No. 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 × 1 = 5]**

a) Define Biotechnology.
b) What is sterilization?
c) Give any one algal source of SCP.
d) What is explant?
e) Write any two renewable energy sources.
f) What is phytoremediation?

Q2) a) Describe micropropagation and its applications. **[6]**

b) Write the importance of proteins in diet. **[4]**

Q3) a) Explain restriction enzymes and write its applications. **[6]**

b) Write steps of media preparation. **[4]**

Q4) a) Describe the concept of Bioinformatics and classification of database. **[6]**

b) Explain the concept of biogas **[4]**

P.T.O.

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

a) Importance of Biotechnology

b) Hardening

c) DNA ligase.

d) Acceptability of SCP.

e) Non renewable energy sources.

f) Genomics

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Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[6154]-60
S.Y. B.Sc. (Regular)
ZOOLOGY
ZO-241 : Animal Diversity-IV
(2019 Pattern) (Semester-IV) (Theory) (CBCS) (Paper-I) (24151)

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) Write any two examples of class Aves.

b) Write any one example of egg laying mammal.

c) Write any two examples of snake.

d) What is gnathostomata?

e) Write any one habit of Rat.

f) Define longitudinal migration in birds.

Q2) a) Give the general characters of class Reptilia. **[6]**

OR

a) Describe digestive system of Rat.

b) Write the functions of brain of Rat.

[4]

Q3) a) Describe the salient features of class Mammalia. **[6]**

OR

a) Describe male reproductive system of Rat.

b) Describe in brief flight adaptations in birds.

[4]

P.T.O.

Q4) a) Sketch and label internal structure of hear of Rat. **[6]**

OR

a) Sketch and label V.S. of eye of Rat.

b) Describe the structure of ear in Rat.

[4]

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

a) Rat snake.

b) Fish catching beak.

c) Advantages of bird migration.

d) Aquatic mammals.

e) Sexual diamorphism in Rat.

f) Gaseous exchange in Rat.

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Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[6154]-61

S.Y. B.Sc.

ZOOLOGY

ZO-242 : Applied Zoology - II

(2019 Pattern) (CBCS) (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) Write the biological name of Western bee

b) Define fishery

c) Define supersedure

d) What is fish fin soup?

e) What is Propolis?

f) Give biological name of Pearl oyster.

Q2) a) Describe Harvesting methods of Harpadon and Mackerel. **[6]**

OR

Describe life cycle of Honey bee.

b) Explain Round dance. **[4]**

Q3) a) Give uses of bee Wax and Royal jelly. **[6]**

OR

Describe Dol net and cast net.

b) Write short note on Brakish water fishery. **[4]**

P.T.O.

Q4) a) Describe Honey extractor and bee box. **[6]**

OR

Describe Habit habitat and cultural methods of Cirrhinus mrigala.

b) Give nesting behaviour of Apis indica. **[4]**

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

a) Canning

b) Summer management in honey bee

c) Fish manure

d) Sac brood disease

e) Chilling

f) Green bee eater and Lizard as a bee pests.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[6154]-62

S.Y. B.Sc. (Regular)

GEOLOGY

GL-221 : Global Tectonics and Geodynamics of the Lithosphere

(2019 Pattern) (Semester-IV) (24161) (Credit System)

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) ***Q.2 to Q.5 carry equal marks.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) Answer the following (any5) **[5]**

a) Mohorovicic discontinuity.

b) Isostacy.

c) Continental drift.

d) Continental crust.

e) Plate boundary.

f) Composition of core

Q2) Answer the following:

a) Explain wilson cycle. **[6]**

b) Indirect Observations in exploration of earths interior. **[4]**

Q3) Answer the following:

a) Explain concept of craton. Shield & Mobile belt. **[6]**

b) Morphology of ocean floor. **[4]**

P.T.O.

Q4) Answer the following.

a) Explain the interaction of lithosphere and asthenophere. **[6]**

b) Physical properties and characteristics of crust. **[4]**

Q5) Write a note on (any 4) **[10]**

a) Tectonic setting of Island are

b) LVZ

c) Asthenosphere.

d) MOR

e) Geotherms.

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Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[6154]-63

S.Y. B.Sc. (Regular)

GEOLOGY

GL 222 : Environmental Geology and Geogenic Disasters

(2019 Pattern) (Semester-IV) (Credit System) (Paper-II) (24162)

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) ***Q.2 to Q.5 carry equal marks.***

Q1) Answer the following questions in 2-3 line (Any five) One mark each. **[5]**

a) Define natural hazard.

b) What is Richter scale?

c) Define agricultural drought.

d) What is Minamata Disease.

e) Define socio-geological environment.

f) What is meant by bio-geochemical cycles.

Q2) Answer the following:

a) What is meant by droughts? Explain different types of droughts. **[6]**

b) Explain in detail organic pollutants. **[4]**

Q3) Answer the following:

a) Explain significance of Geology in Disaster management plan for Earthquakes. **[6]**

b) Explain surface water resources. **[4]**

P.T.O.

Q4) Answer the following. **[6]**

a) What are water quality parameters? Explain B.I.S. standards.

b) Explain heavy metal pollution. **[4]**

Q5) Write Short notes on (any 4) **[10]**

a) Building code.

b) Arsenic poisoning.

c) Richter scale.

d) Natural hazard zones.

e) Impact assessment evolution.

f) Fluorosis.

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Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 3

[6154]-64
S.Y. B.Sc.
STATISTICS
ST - 241 : Tests of Significance And Statistical Methods
(2019 Pattern) (CBCS) (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 Statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following:

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

a) Confidence interval for population proportion (P) is

i) $\left(p - Z_{\alpha/2}\sqrt{\frac{pq}{n}}, p + Z_{\alpha/2}\sqrt{\frac{pq}{n}} \right)$

ii) $\left(p - Z_{\alpha/2}\frac{pq}{n}, p + Z_{\alpha/2}\frac{pq}{n} \right)$

iii) $\left(p - Z_{\alpha/2}\frac{\sqrt{pq}}{n}, p + Z_{\alpha/2}\frac{\sqrt{pq}}{n} \right)$

iv) $\left(p - Z_{\alpha/2}\frac{pq}{\sqrt{n}}, p + Z_{\alpha/2}\frac{pq}{\sqrt{n}} \right)$

b) If C is the width of an age group, then formula to obtain total fertility rate is

i) $C\sum(A.S.F.R.)$ ii) $\sum(A.S.F.R.)^C$

iii) $C / \sum(A.S.F.R.)$ iv) $C\sum(A.S.F.R.)/1000$

P.T.O.

c) The range in which multiple correlation coefficient lies is.

i) $-\infty$ to ∞ ii) 0 to 1

iii) –1 to 1 iv) 0 to ∞

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

i) X_1, X_2, X_3 can be treated as residuals of order zero.

ii) Net Reproduction Rate (NRR) mainly depends on number of female births.

Q2) Attempt any two of the following : **[5]**

a) A company claims that it puts 10 kg of basmati rice into a bags on an average. A random sample of 100 bags gave average weight 9.8 kg. If population variance is 0.5 kg^2. Test whether the average weight is 10 kg. against the alternative that it is less than 10 kg.Use 5% level of significance.

b) If all the total correlation coefficients r_{12}, r_{13}, r_{23} are equal to ρ ($\rho \neq \pm 1$) then show that

i) $R^2_{1.23} = \dfrac{2\rho^2}{1+\rho}$ ii) $r_{12.3} = \dfrac{\rho}{1+\rho}$

iii) $1 - R^2_{1.23} = \dfrac{(1-\rho)(1+2\rho)}{(1+\rho)}$

c) At a cycle repair shop, on an average one customer arrives per 5 minutes and service time is 4 minutes per customer. Assuming that all conditions for using M/M/1 model are satisfied, find

i) Probability that server is busy

ii) Probability that server is idle

iii) Expected length of the system

iv) Average queue length

Q3) Attempt any two of the following : **[5]**

a) Explain the terms:
   i) Statistic
   ii) Parameter
   iii) Standard error of statistic
   iv) Hypothesis
   v) Null hypothesis

b) In a trivariate data if $r_{13} = -0.5$, $r_{12} = 0.5$ prove that $-1 \leq r_{23} \leq 0.5$

c) Explain what is Standardized Death rate (S.T.D.R) and also explain the methods of obtaining S.T.D.R.

Q4) Attempt any one of the following :

a) i) Explain the test procedure for testing $H_0 : P_1 = P_2$ against $H_1 : P_1 \neq P_2$, where P_1 and P_2 are population proportions. **[6]**

   ii) Explain the following terms **[4]**
   I) Customer.
   II) Waiting time.
   III) Queue length.
   IV) Traffic density.

b) i) A sample of 100 electric bulbs from company A gave an average life of 1200 hours with a standard deviation of 35 hours. Another sample of 150 electric bulbs from company B gave an average life of 1285 hours with standard deviation of 40 hours. Can we say that the two companies producing bulbs of same average life? **[5]**

   ii) Calculate **[5]**
   I) General Fertility Rate (G.F.R.)
   II) Age-specific Fertility Rate (A.S.FR.)
   III) Total Fertility Rate (T.F.R.) for the data given below :

Age-group	Number of women (in thousands)	Number of births
15-20	8	56
20-25	10	100
25-30	12	84
30-35	6	36
35-40	3	15
40-45	5	5
45-30	4	4

Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 2

[6154]-65
S.Y. B.Sc.
STATISTICS
ST - 242 : Sampling Distribution and Exact Tests
(2019 Pattern) (CBCS) (Semester - IV) (Paper - II) (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 statistical tables and calculator is allowed.***
4) ***Symbols and abbreviations have their usual meaning.***

Q1) Attempt each of the following :

a) In each of the following cases, choose the correct alternative : **[1 each]**

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

A) G(25, 4) B) G(5, 20)

C) G(1, 4) D) G(5, 4/5)

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

A) 6 B) 7

C) 8 D) 16

iii) If $X \rightarrow F(4, 5)$ then E(X) is

A) 5/3 B) 14/5

C) 1 D) 5/7

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

i) Let $t \rightarrow t_n$, then $t^2 \rightarrow F_{(n, 1)}$.

ii) Chi-square distribution is a particular case of Gamma distribution.

P.T.O.

Q2) Attempt any **two** of the following : **[5 each]**

a) State and prove the additive property of chi-square distribution.

b) With usual notation, show that for t-distribution with n d.f.

$$\mu_{2r} = \frac{n(2r-1)}{n-2r}\mu_{2r-2}; 2r < n$$

c) Let $X \to N(\mu, \sigma^2)$ & $Y \to N(\mu_2, \sigma^2)$ where σ^2 is unknown, describe the test procedure for testing $H_0 : \mu_1 = \mu_2$ against $H_0 : \mu_1 \neq \mu_2$.

Q3) Attempt any **two** of the following : **[5 each]**

a) Derive an expression for mode of random variable $F(n_1, n_2)$.

b) State probability density function of $G(\alpha, \lambda)$. Also find it's mean and variance.

c) Identify the distribution of a r.v. X if it's m.g.f is $Mx(t) = (1 - 2t)^{-5}$ where $t < ½$, also find the median and mode of X.

Q4) Attempt any **one** of the following :

a) i) Let $X_1, X_2, ...X_{60}$ be i.i.d N(0, 20) variates.

Find $P\left[\sum_{i=1}^{60} X_i^2 < 65.227\right]$. **[5]**

ii) Let $X \to N(\mu, \sigma^2)$, μ unknown, describe the test procedure for testing $H_0 : \sigma^2 = \sigma_0^2$ against $H_0 : \sigma^2 \neq \sigma_0^2$. **[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 $P(3.8 < \bar{X} < 5.6, 5.637 < S^2 < 11.951)$. **[5]**

ii) Show that all odd ordered central moments of t-distribution with n degrees of freedom are zero. **[5]**

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Total No. of Questions : 5]

SEAT No. :

P-7344

[Total No. of Pages : 2

[6154]-66

S.Y. B.Sc.

GEOGRAPHY

GG-241 : Environmental Geography - II

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

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) ***Question 2 to question 5 carry equal marks.***
4) ***Use of map stencil is allowed.***

Q1) **Answer the following questions in 20 words (any five) :** **[5]**

a) Define forest conservation.

b) Write full form of UNEP.

c) Write any two benefits of EIA.

d) What is Wildlife?

e) Define term 'deforestation'.

f) Write the names of major programme for environmental protection and conservation in India.

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

i) Write any two environmental policies in developed country in detail.

ii) Explain the need and importance of to study the environmental geography.

iii) Describe the importance of forest conservation.

b) Answer the following question in 150 words (any one) : **[4]**

i) Explain the need of environmental planning and management.

ii) Write the necessity of energy conservation.

P.T.O.

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

i) Write steps in Environment Impact Assessment.

ii) State the reasons for holding the world summit 2002.

iii) Write any three provisions made in forest conservation act - 1980.

b) Answer the following question in 150 words (any one) : **[4]**

i) Explain the water conservation with respect to Ganga action plan.

ii) Describe the nature and scope of Environment Impact Assessment.

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

i) Describe Delphi method of EIA.

ii) Explain the various aspects of environmental management.

iii) State the various activities of tiger conservation in India.

b) Answer the following question in 150 words (any one) : **[4]**

i) Explain the causes of deforestation.

ii) Describe in detail the stockholm conference - 1972.

Q5) **Write short notes on the followings (any four) :** **[10]**

a) Adhoc method of EIA.

b) Approaches of environmental management.

c) Role of NGO in environmental conservation.

d) Kyoto Protocol - 1997.

e) Need and Importance of Environment Impact Assessment.

f) Wildlife protection act - 1972

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Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[6154]-67
S.Y.B.Sc.
GEOGRAPHY
Gg - 242 : Geography of Maharashtra (Human - II)
(CBCS 2019 Pattern) (Semester - IV) (Paper - II) (24182) (Regular)

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) ***Questions 2 to 5 carry equal marks.***

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

a) What is rank of Maharashtra in population?

b) What is meant by interstate migration?

c) Write Two names of IT centers in maharashtra.

d) Write any two names of Highways in maharashtra.

e) Enlist any two wine industries in maharashtra.

f) Which are the Grape producing districts.

Q2) a) Describe the following questions. (Any Two). **[6]**

i) Describe urban to urban migration in maharashtra.

ii) Write development of sugarcane industry in maharashtra.

iii) Explain migration in maharashtra.

b) Write answers of the following questions. (Any Two) **[4]**

i) Explain Bajra as a major food crop.

ii) Write in detail the development of IT industry.

iii) Describe Road transportation in maharashtra.

P.T.O.

Q3) a) Give explaination of the following questions. (Any Two) **[6]**

i) How is the trend of interstate migration in maharashtra?

ii) Why there is prospects for sugarcance industry in maharashtra?

iii) Describe Onion as a cash crop.

b) Give reasons of the following questions (Any Two) **[4]**

i) How population of maharashtra is unevenly distributed?

ii) Write about samruddhi marg in maharashtra.

iii) Why cotton as a cash crop?

Q4) a) Discuss the following questions. (Any Two) **[6]**

i) Discuss prospects of Agriculture in maharashtra.

ii) Explain transportation in maharashtra.

iii) How Grape is sensitive crop?

b) Write answers of the following questions. (Any Two) **[4]**

i) Write development of cotton industry in maharashtra.

ii) Which are the challanges of Agriculture in maharashtra.

iii) Explain industrial belt in maharashtra.

Q5) Write short notes on the following points. (Any Four) **[10]**

a) Water transport.

b) Sugar cane crop.

c) Wheat as a food crop.

d) IT industry.

e) Interstate migration.

f) Electronic media.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

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S.Y. B.Sc.

MICROBIOLOGY

MB-241 : Bacterial Genetics

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

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) Define replication

b) Which organism was used in transformation experiment by Frederick Griffith?

c) State the difference between DNA and RNA.

d) Enlist any two stop codons.

e) In which type of gene mutation, a base - pair change alters an mRNA codon for an amino acid to a stop codon?

f) A _____ is a DNA molecule or sequence that has replication origin and is capable of being replicated.

Q2) a) Describe the following Any two : **[6]**

i) Describe the differences between B-DNA and Z-DNA.

ii) Describe the conservative mode of replication.

iii) Describe the initiation process of protein synthesis.

b) Diagrammatically describe the Meselson's and stahl's experiment of semiconservative replication. **[4]**

P.T.O.

Q3) a) Explain the following Any two : **[6]**

i) Explain the difference between leading and lagging strand.

ii) Explain the concept of reverse mutations.

iii) Explain the concept of plasmid amplification.

b) Write in detail about rolling circle mode of replication. **[4]**

Q4) a) Describe the following Any two : **[6]**

i) Discuss the outcomes of Griffith's experiment of transforming principle.

ii) Discuss in detail about the four nitrogenous bases of DNA.

iii) Discuss in brief about the role of ribosomes in translation.

b) With neat and labeled diagram explain the structure of DNA double helix. **[4]**

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

a) Structure of RNA

b) DNA polymerox

c) Frameshift mutations

d) Col plasmid

e) Promoter

f) Intercalating agents

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Total No. of Questions : 5]

SEAT No. :

P7347

[Total No. of Pages : 2

[6154]-69
S.Y.B.Sc.
MICROBIOLOGY
MB - 242 : Air, Water and Soil Microbiology
(CBCS 2019 Pattern) (Semester - IV) (24192) (Regular)

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 are aerosols?

b) _____ is a method used to estimate the concentration of viable micro organisms in a sample by means of replica liquid broth in ten-fold dilutions.

c) MPCB stands for _____.

d) What are airborne infections? Give any one example.

e) Define biofertilizers.

f) Define symbiosis.

Q2) a) Describe the following Any two : **[6]**

i) Describe the transient nature of air flora.

ii) Describe different waterborne infections.

iii) Describe the importance of biocontrol agents with appropriate examples.

b) Describe the role of microorganisms in composting. **[4]**

Q3) a) Explain the following Any two : **[6]**

i) Explain in detail the method of air sampling - impaction on solids.

ii) Explain the role of droplet nuclei in airborne infections.

iii) Explain the large scale production of biofertilizers.

b) Write in detail the role of microorganisms in carbon cycle. **[4]**

P.T.O.

Q4) a) Discuss the following Any two: **[6]**

i) Discuss the different types of water.

ii) Discuss the role of Bureau of Indian Standards (BIS) in determining standards for potability of water.

iii) Discuss the role of microorganisms in humus formation

b) Discuss the membrane filtration technique. **[4]**

Q5) Write short notes on any four of the following : (6 options) **[10]**

a) Biological nitrogen fixation.

b) Functions of CPCB.

c) Presumptive test.

d) Faecal indicator organisms.

e) Commensalism.

f) Ventilation.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. Of Pages : 2

[6154]-70

S.Y.B.Sc.

NANOSCIENCE & NANOTECHNOLOGY

N.S. 241 - Organic and Polymer Science of Nanomaterials

(Credit System) (2019 Pattern) (Semester - IV) (Paper - I) (24261)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

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

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

a) Give the name of multiwalled nanotube model.

b) Define 'Nano composite'.

c) What is 'graphene'?

d) What are 'Homochain' and 'Heterochain'?

e) Define the term 'Biopolymer'.

f) What is thermoplast polymer?

Q2) **Attempt any one of the following .**

a) i) Explain in detail 'Bio-degradable' polymer. **[6]**

ii) Explain mechanism of 'free radical'

b) What is nanofiller? Explain classification of Nanofillers. **[4]**

P.T.O.

Q3) **Attempt any one of the following :**

a) i) Explain in detail cataionic polymerization. **[6]**

ii) Explain 'Electrochemical polymerization'.

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

Q4) **Attempt any one of the following :**

a) i) Explain growth mechanism of carbon nano tubes. **[6]**

ii) Give the salient features of different polymerization techniques.

b) Explain in detail 'Anionic polymerization'. **[4]**

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

a) Carbon nanotubes

b) Catalyst free growth

c) Electrochemical polymerization

d) Addition polymerization

e) Liquid crystalline polymerization

f) Polymer

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[6154]-71
S.Y.B.Sc.
NONOSCIENCE AND NANOTECHNOLOGY
NS - 242 : Advanced Techniques for Characterization of Nanomaterials
(CBCS 2019 Pattern) (Semester - IV) (Paper - II) (24262)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Qestion 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Draw neat & labeled diagram wherever necessary.***
5) ***Figures to the right indicate full marks.***

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

a) What is the principle of SEM?

b) What is the use of exciter filter in fluorescence microscopy?

c) What is RF SQUIDS?

d) What is mean by Josephson junction?

e) What is bright field images?

f) Define dimpling process.

Q2) a) Attempt any ONE of the following. **[6]**

i) With neat labeled diagram explain vibrating sample magnetometer.

ii) With neat labeled diagram explain FESEM.

b) Explain HRTEM in brief with neat diagram. **[4]**

P.T.O.

Q3) a) Attempt any ONE of the following. **[6]**

i) What is the principle of EDAX? Also explain EDAX in brief.

ii) With proper diagram explain confocal microscope.

b) Explain DSC analysis technique in brief. **[4]**

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

i) Explain biological sample preparation method for SEM.

ii) Draw neat labeled diagram of Fluoresence microscope & give it's advantages.

b) Give the difference between SEM & TEM. **[4]**

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

a) Applications of EDAX.

b) Dark field images of TEM.

c) Sample preparation for the SEM.

d) Applications for DSC technique.

e) Selected Area Electron Diffraction (SAED).

f) Electron-matter interaction.

Total No. of Questions : 5]

SEAT No. :

P7350

[Total No. of Pages : 2

[6154]-72
S.Y.B.Sc. (Regular)
ELECTRONIC SCIENCE
EL - 241 : Analog Circuit Design
(CBCS 2019 Pattern) (Semester - IV) (24221)

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

a) List the applications of OP-AMP.

b) Write an output equation for Integrator.

c) What is mean by passive heat sink?

d) Define gain of an amplifier.

e) What is dc loadline?

f) What is the efficiency of class A power amplifier with transformer coupled load?

Q2) Answer the following.

a) i) Explain Gain Bandwidth product. **[2]**

ii) With neat labelled diagram explain complementary symmetry class B push pull amplifier. **[4]**

b) Explain the concept of negative feedback. **[4]**

Q3) Answer the following.

a) i) List any four applications of integrator. **[2]**

ii) Explain the working of function generator circuit using OP-AMP. **[4]**

b) Design the phase shift oscillator for frequency.

f_o = 565 Hz. **[4]**

P.T.O.

Q4) Answer the following.

a) i) Calculate the voltage gain for inverting amplifier if $R_f = 57k\Omega$ & $R_1 = 10k\Omega$. **[2]**

ii) Show that the conversion efficiency of class A power amplifier with resistive load is 25%. **[4]**

b) Explain the differentiator circuit using OP-AMP. **[4]**

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

a) Types of oscillator.

b) Heat sink.

c) Small signal amplifier.

d) Harmonic distortion.

e) Two stage Amplifier.

f) OP-AMP based multivibrator circuit.

Total No. of Questions : 5]

SEAT No. :

P-7351

[Total No. of Pages : 2

[6154]-73

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL-242 : Microcontroller and Python Programming

(2019 Pattern) (CBCS) (Semester - IV) (Paper - II) (24222)

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 No. 2 to Question No. 5 carry equal marks.***

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

a) Write any two software system on which Arduino software IDE works.

b) What is the difference between analog and digital pins of Arduino?

c) Which are the two main function used in Arduino program?

d) List any two built in function in python.

e) How modules can be imported?

f) Define python dictionary.

Q2) a) Answer the following :

i) Write different steps to install and run Arduino. **[2]**

ii) Explain is detail arithmatic, logical and assignment operators of Arduino. **[4]**

b) Draw the pin diagram of Atmega328P microcontroller and explain pin function. **[4]**

Q3) a) Answer the following :

i) Explain python program architecture in short. **[2]**

ii) Write a python program for division of two numbers write output of the program. **[4]**

b) Explain how push button is interfaced to Arduino, write Arduino code for the same. **[4]**

P.T.O.

Q4) a) Answer the following :

i) What is the difference between list and tuple? **[2]**

ii) Explain following statement in python. **[4]**

I) Pass statement

II) Continue statement

b) Write a python code for blinking LED's. **[4]**

Q5) Solve <u>any four</u> of the following : **[10]**

a) What is function? Write advantages of function in Arduino.

b) Write short note on comparison operator in Arduino.

c) Write short note on Python variables.

d) Explain for loop statement used in python with suitable example.

e) Write a python code for demonstration of creating string and explain it.

f) Explain dictionary operations and methods in short.

Total No. of Questions : 5]

SEAT No. :

P-7352

[Total No. of Pages : 2

[6154]-74

S.Y. B.Sc.

PSYCHOLOGY

Health Psychology

(2019 Pattern) (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 from 2 to 5 carry equal marks.***

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

a) Define health Psychology.

b) What is coping?

c) Define resilience.

d) Define stress.

e) What is health behavior?

f) State the importance of exercise.

Q2) a) Classify the human strengths and virtues. **[6]**

OR

What are the effects of stress on physical and mental health.

b) Examine the various components of health. **[4]**

Q3) a) Describe the bio-psychosocial model of health. **[6]**

OR

How to cultivate inner strengths by hope and optimism?

b) Explain the mind body relationship model. **[4]**

P.T.O.

Q4) a) Describe the causes, process and treatment of cancer as a chronic Illness. **[6]**

OR

Explain REBI as a appraisal focused coping pattern.

b) Prioritize the barriers of health behavior. **[4]**

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

a) Nature of coping

b) Characteristics of health behavior

c) Chronic Illness

d) Well Being & health

e) Nutrition & health

f) Holistic Health

Total No. of Questions : 5]

SEAT No. :

P-7353

[Total No. of Pages : 2

[6154]-75
S.Y. B.Sc.
PSYCHOLOGY
Psychological Testing and Applications (Regular)
(2019 Pattern) (Credit System) (Semester - IV)
(Paper - II) (24202)

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 from 2 to 5 carry equal marks.***

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

a) Define Attitude.

b) State the full form of TAT.

c) Define intelligence.

d) What is abnormal behavior?

e) What is value assessment?

f) State the areas of marital adjustment.

Q2) a) Discuss briefly Rorschach ink bolt test. **[6]**

OR

Explain any one test that assess neurological problems.

b) Critically evaluate the factors of mental health. **[4]**

Q3) a) Describe in detail any one test used for assessing career interest with their psychometric properties. **[6]**

OR

Explain any two types of test uses for assessing parent - Child relationship.

b) Compare any two types of scientific aptitude test. **[4]**

P.T.O.

Q4) a) Explain any one psychological test measures level of stress. **[6]**

OR

Describe family attitude scale with their domains.

b) Evaluate the job satisfaction scale with their component. **[4]**

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

a) Anxiety test

b) Social attitude test.

c) Advantages of projective technique

d) Musical aptitude.

e) Vocational Interest

f) Organization commitment

Total No. of Questions : 5]

SEAT No. : ____

P-7354

[Total No. of Pages : 2

[6154]-76

S.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS-241 : Biological Diversity & it's Conservation

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

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 No. 2 to No. 5 carry equal marks.***

Q1) **Attempt any FIVE of the following :**

a) Name the Hotspot in India. **[1]**

b) Enlist any 2 Non-Ecological Significances of Biodiversity. **[1]**

c) What do you mean by Land races. **[1]**

d) Name the methods used for measurement of Genetic diversity. **[1]**

e) Enlist 4 factors affecting the distribution of Species Richness. **[1]**

f) Who gave the theory of Evolution. **[1]**

Q2) **Answer the following :**

a) Explain "Ecosystem can balance the Ecological Aspects". **[6]**

b) Explain the concept of Endemism in India with correct example. **[4]**

Q3) **Answer the following :**

a) Explain how involvement of population can help in Biodiversity conservation. **[6]**

b) What are features that make India a Mega-diversity country? **[4]**

P.T.O.

Q4) **Answer the following :**

a) Write the contribution of various scientists in classification of Ecosystem. **[6]**

b) How can species diversity of an Ecosystem be measured. **[4]**

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

a) Levels of Biological Diversity. **[2½]**

b) Types of Ecosystem in India **[2½]**

c) Transgenic Organism **[2½]**

d) Effect of Habitat Destruction **[2½]**

e) Environment Protection Act **[2½]**

f) Traditional method of conservation **[2½]**

Total No. of Questions : 5]

SEAT No. :

P-7355

[Total No. of Pages : 2

[6154]-77

S.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS-242 : Environmental Pollution Control Technology

(2019 Pattern) (Semester - IV) (Paper - II) (24242)

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 No. 2 to No. 5 carry equal marks.***

Q1) **Attempt any FIVE of the following :**

a) Define the term plume behaviour. **[1]**

b) What is water quality monitoring? **[1]**

c) What are the parameters to measure the soil quality? **[1]**

d) What is sound insulation? **[1]**

e) What is mean by phytoremediation? **[1]**

f) Define the term forest inventory. **[1]**

Q2) **Answer the following :**

a) Explain the process of biogas with one stage and second stage digester. **[6]**

b) Write note on stack gas monitoring techniques. **[4]**

Q3) **Answer the following :**

a) What should be the main considerations of site and parameter selection for ambient air quality monitoring? **[6]**

b) Explain tertiary waste water treatment. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Explain the noise control measures at source. **[6]**

b) What is organic farming and its advantages? **[4]**

Q5) **Write a short note on Any Four of the following :**

a) Classification of forest **[2½]**

b) Vibration damping & isolation **[2½]**

c) Soil carbon flux **[2½]**

d) Biopesticides **[2½]**

e) Rotating contactor **[2½]**

f) Objectives of soil quality monitoring **[2½]**

Total No. of Questions : 4]

SEAT No. : ____

P-7356

[Total No. Of Pages : 2

[6154]-78
S.Y. B.Sc.
DEFENCE & STRATEGIC STUDIES
DS - 401: International Security
(2019 Pattern) (Semester - IV) (24231)

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]**

1) Define Nation.

2) What is International Law?

3) Define National Security.

4) What is Nationalism ?

5) What is Common Security?

Q2) **Write short notes on (any two)** **[10]**

1) Regionalism

2) Non-Alignment

3) National Power

P.T.O.

Q3) **Attempt the following questions (any two)** **[10]**

1) State the Concept of Nation Power.

2) State the Importance of International Law.

3) Explain the Significance of Disarmament.

Q4) **Answer in details (any one)** **[10]**

1) Explain the International Law role in maintaining World Peace and Security.

2) Explain International security: current issues and contemporary application.

Total No. of Questions : 4]

SEAT No. : ____

P7357

[Total No. of Pages : 1

[6154]-79

S.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 402 : Defence Economics

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

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) Write full form of DRDO.
b) Define military expenditures.
c) Define the Central budget.
d) Write types of budget.
e) What is arms sales?

Q2) Write short notes on (any two) **[10]**

a) B.E.L. (Bharat Electronics Ltd).
b) WTO.
c) The Political Economy.

Q3) Attempt the following questions (any two) **[10]**

a) Explain the Parliamentary Budget of India.
b) Describe the Basic Concepts of Planning of Defence Budget.
c) Explain the role of Defence Economics.

Q4) Answer in details (any one) **[10]**

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

Total No. of Questions : 4]

SEAT No. : ____

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[Total No. of Pages : 1

[6154]-80
S.Y.B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 403 : Defence Journalism
(2019 Pattern) (Credit System) (Semester - IV) (Regular) (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 Print media.

b) Define Digital media.

c) Define Conflict Management.

d) Define Web media.

e) Define broadcast media.

Q2) Write short notes on (any two) **[10]**

a) Responsibilities of Media.

b) Elements of journalism.

c) Statements of purpose

Q3) Attempt the following questions (any two) **[10]**

a) Explain the Essential knowledge for a Defence Journalist.

b) Write the principles of journalism.

c) State the Role of Defence Journalism in Conflict Management.

Q4) Answer in details (any one) **[10]**

a) Discuss in detail the Role of Defence Journalism in Peace Studies.

b) Discuss in detail the Role of Defence Journalism in National Security Studies.

Total No. of Questions: 3]

SEAT No. :

P7359

[Total No. of Pages :1

[6154]-81

S.Y.B.Sc. (Regular) (Computer Science /Bio-Technology)
ENGLISH - ABILITY ENHANCEMENT COMPULSORY COURSE
(2019 Pattern) (Semester-IV) (2432 1) (Credit System)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

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

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

a) Why did the speaker fear that there was little Prospect of his getting back the dollar in the story My Lost Dollar?

b) What is the message given in the poem Stopping by woods on a snowy Evening.

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

a) As a student Representative draft a notice informing the college students about the interview being organized of a film Celebrity at the college campus.

b) Purpose an agenda for a meeting to be organized for planning the sports and cultural events in your college

c) What is content Writing?

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

a) Differentiate between Hard skills and soft skills

b) Write a note on SWOT/C Analysis

c) How would you set short term and long term goods to achieve your target

Total No. of Questions : 3]

SEAT No. :

P7360

[Total No. of Pages : 1

[6154]-82
S.Y.B.Sc. (Regular)
MARATHI (मराठी)
AECC-IVB : पाठ्यपुस्तक : मराठी कथा दर्शन (Theory)
(2019 Pattern) (CBCS) (Semester - IV) (24331)

वेळ : 2 तास] [एकूण गुण : 35

सूचना : 1) सर्व प्रश्न सोडविणे आवश्यक आहेत.

2) उजवीकडील अंक प्रश्नांचे पूर्ण गुण दर्शवितात.

प्र.1) खालीलपैकी कोणत्याही एका विषयावर 300 शब्दांत निबंध लिहा. **[10]**

अ) ध्वनीप्रदूषण आणि आरोग्य

ब) लोकसंख्येचा विस्फोट

क) विद्या विनयेन शोभते

प्र.2) खालीलपैकी तीन प्रश्नांची उत्तरे 100 शब्दांत लिहा. **[15]**

अ) 'अथेन्सचा प्लेग' कथेतील राजनची व्यक्तिरेखा स्पष्ट करा.

ब) पर्यावरण ऱ्हासाच्या दुष्परिणामाच्या पार्श्वभूमीवर 'एक शहर मेले त्याची गोष्ट' या कथेचे कथानक स्पष्ट करा.

क) 'लिंपण' या कथेतील सामाजिक विषमतेचे चित्रण करा.

ड) '15 ऑगस्ट 1947' या कथेतील रामराव पाटील व रझाकार यांच्यातील संघर्ष थोडक्यात लिहा.

इ) 'एका यंत्रमानवाच्या मनाचा शोध' या कथेतील सदानंदची व्यक्तिरेखा स्पष्ट करा.

प्र.3) खालीलपैकी एका प्रश्नाचे उत्तर 300 शब्दांत लिहा. **[10]**

अ) 'पुढल्या हाका' या कथेतील सूचकता कथानकाच्या आधारे स्पष्ट करा.

ब) 'ओझं' या कथेतून प्रकट झालेला शेतकरी जीवनाचा संघर्ष सविस्तर स्पष्ट करा.

Total No. of Questions : 3]

SEAT No. :

P7361

[Total No. of Pages : 1

[6154]-83
S.Y.B.Sc. (Regular)
HINDI (हिंदी)
AECC-IV C : हिंदी काव्य तथा कहानी साहित्य
(2019 Pattern) (Credit System) (Semester - IV) (24341)

समय : *2* घंटे*]* *[* पूर्णांक *: 35*

सूचनाएँ : *1)* सभी प्रश्न अनिवार्य है।

2) दाहिनी ओर लिखे अंक प्रश्न के पूर्णांक है।

प्र.*1)* निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर लिखिए। **[15]**

अ) झाँसी की रानी की वीरता का वर्णन अपने शब्दों में लिखिए।

ब) 'गीत–फरोश' कविता के माध्यम से कवि कौन–सा संदेश देना चाहते है?

क) 'मधुशाला' कविता के माध्यम से कवि ने जीवन को कैसे व्याख्यायित किया है?

ड) 'भुख' कविता का आशय स्पष्ट कीजिए।

इ) 'रोटी और संसद' कविता में कवि ने भारतीय लोकतंत्र पर गहरी चोट करती है, स्पष्ट कीजिए।

प्र.*2)* निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर लिखिए। **[15]**

अ) 'पत्नी' कहानी की सुनंदा का परिचय दीजिए।

ब) 'बेटा' कहानी में अनमेल विवाद की समस्या पर प्रकाश डाला गया है, स्पष्ट कीजिए।

क) पानाराम का चरित्र–चित्रण कीजिए।

ड) अमोल के स्वेटर के बारे में मोहल्लेवाले क्या सोचते थे?

इ) 'ईश्वर का द्वंद' कहानी की कथावस्तु लिखिए।

प्र.*3)* निम्नलिखित में से किसी एक प्रश्न का उत्तर लिखिए। **[5]**

अ) 'शर्त' कहानी की कथावस्तु अपने शब्दों में लिखिए।

ब) 'झाँसी की रानी' कविता का आशय लिखिए।

Total No. of Questions : 4]

SEAT No. :

P7362

[Total No. of Pages : 2

[6154]-84
S.Y. B.Sc. (Regular)
SANSKRIT (संस्कृत)
AECC-II E : Gīrvaṇabhārati
गीर्वाणभारती (निवडक वेचे)
(2019 Pattern) (Credit System) (Semester - IV) (24351)

वेळ : *2* तास] [एकूण गुण : *40*

सूचना : 1) **All questions are compulsory.**
सर्व प्रश्न सोडविणे आवश्यक आहेत.

2) **Figures to the right indicate full marks.**
उजवीकडील अंक पूर्ण गुण दर्शवितात.

प्र.*1)* Write an answer in 2 - 4 lines on the following questions. **[16]**

पुढील प्रश्नांची दोन ते चार ओळीत उत्तरे लिहा.

i) From which text, lesson 'सद्धर्मपुण्डरीककथा' has taken?

'सद्धर्मपुण्डरीककथा' हा पाठ कोणत्या ग्रंथातून घेतली आहे?

ii) Which topics are discussed in वास्तुशास्त्र.

वास्तुशास्त्रात कोणत्या विषयाची चर्चा केली जाते?

iii) How many types of खनित्र state any two of them.

खनित्राचे प्रकार किती आहेत? त्यापैकी कोणतेही दोन लिहा.

iv) What is meant by the word आयुर्वेद?

आयुर्वेद शब्दाने काय सूचित केले आहे?

v) What is the definition of the word स्वस्थ?

स्वस्थ शब्दाची व्याख्या काय?

vi) Who is the author of सिद्धान्तशिरोमणि?

सिद्धान्तशिरोमणि ग्रन्थाचा लेखक कोण?

vii) Who is the author of 'वैनायकम्'?

'वैनायकम्' महाकाव्याचे रचयिता कोण?

viii) From which text, lesson 'लीलावती' has taken?

'लीलावती' हा पाठ कोणत्या ग्रंथातून घेतला आहे?

P.T.O.

प्र.2) Write notes (Any two) **[8]**

टिपा लिहा. (कोणत्याही दोन)

i) **विमानभेदा:**

ii) **रसायनशास्त्रम्**

iii) **सद्धर्मपुण्डरीकसूत्रम्**

प्र.3) Write short notes (Any two) **[8]**

लहान टिपा लिहा. (कोणत्याही दोन)

i) **भास्कराचार्य:**

ii) **वैनायकम्**

iii) **वैराग्याचे महत्त्व** Importance of **वैराग्य**

प्र.4) Explain the summary of the lesson '**प्राचीन शास्त्रपरिचय:– (प्रथमो भाग:)**' **[8]**

'प्राचीन शास्त्रपरिचय:– (प्रथमो भाग:)' या पाठाचा सारांश लिहा.

OR/**किंवा**

'Explain the lesson '**लीलावती**' in your own words.

'लीलावती' हा पाठ तुमच्या भाषेत स्पष्ट करा.

Total No. of Questions : 5]

SEAT No. :

P-7363

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[6154]-86

S.Y. B.A./B.Sc.(Regular)/B.Sc.(Computer Science)/ B.Sc.(Biotechnology)B.Sc.(Animation)/B.C.A./ B.Sc.(Hospitality)

AECC : ENVIRONMENTAL STUDIES

(2019 Pattern) (Semester - IV & V)

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 do you mean by Earthquake. **[1]**

b) Define solid waste management. **[1]**

c) Write 1 need of Environment Awareness. **[1]**

d) What is aim of silent valley movement. **[1]**

e) Give 2 example of Nature reserves. **[1]**

f) Give the year of wild life Protection Act. **[1]**

Q2) **Answer the following :**

a) Give the role of Environmental law in conservation of Environment. **[6]**

b) Write in detail about Soil Pollution. **[4]**

Q3) **Answer the following :**

a) How can Environment Awareness be done in the people. **[6]**

b) Define Flood. Write a detail note on flood as a natural disaster. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Define Green House effect. What are the major effects on Earth. **[6]**

b) What are the causes and effects of ozone depletion. **[4]**

Q5) **Write a short note on Any Four of the following :**

a) Pollution **[2½]**

b) Water Pollution **[2½]**

c) Acid Rain **[2½]**

d) Global Warming **[2½]**

e) 3R **[2½]**

f) Chipko Movement **[2½]**

□□□

Total No. of Questions : 5]

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[6154]-86

S.Y. B.A./B.Sc.(Regular)/B.Sc.(Computer Science)/ B.Sc.(Biotechnology)B.Sc.(Animation)/B.C.A./ B.Sc.(Hospitality)

AECC : ENVIRONMENTAL STUDIES

(2019 Pattern) (Semester - IV & V)

(मराठी रूपांतर)

वेळ : 2 तास] *[एकूण गुण : 35*

सूचना : *1) प्रश्न क्र. 1 अनिवार्य आहे.*

2) प्रश्न क्र . 2 ते 5 मध्ये कोणतेही तीन प्रश्न सोडवा.

3) प्रश्न क्र. 2 ते 5 यांना समान गुण आहे.

प्रश्न 1) खालील पैकी कोणतेही पाच प्रश्न सोडवा.

अ) भूकंप म्हणजे काय? **[1]**

ब) घन कचरा व्यवस्थापन ची व्याख्या लिहा. **[1]**

क) पर्यावरण जागृतीची एक गरज लिहा. **[1]**

ड) सायलेंट व्हॅली चळवळ म्हणजे काय? **[1]**

इ) नैसर्गिक संसाधनांचे 2 उदाहरण लिहा. **[1]**

फ) वन्यजीव संरक्षण कायदा अमलाल आल्याचे वर्ष लिहा. **[1]**

प्रश्न 2) खालील प्रश्नाचे उत्तरे द्या.

अ) पर्यावरण संरक्षणासाठी, पर्यावरणिय कायद्यांची भूमिका स्पष्ट करा. **[6]**

ब) मृदा प्रदूषणा बद्दल थोडक्यात माहिती लिहा. **[4]**

प्रश्न 3) खालील प्रश्नाचे उत्तरे द्या.

अ) लोकांमध्ये पर्यावरण जागृती कशी करता येईल. **[6]**

ब) पुराची व्याख्या लिहा. नैसर्गिक आपत्ती म्हणून पुरावर तपशीलवार नोंद लिहा. **[4]**

प्रश्न 4) खालील प्रश्नाचे उत्तरे द्या.

अ) हरितगृह परिणाम ची व्याख्या लिहा. पृथ्वीवरील त्याचे मुख्य परिणाम काय आहेत ते परिभाषित करा. **[6]**

ब) ओझोन कमी होण्याची कारणे आणि परिणाम काय आहेत. **[4]**

प्रश्न 5) थोडक्यात टिपा लिहा. (कोणत्याही चार) :

अ) प्रदूषण **[2½]**

ब) जल प्रदुषण **[2½]**

क) अम्ल पर्जन्य **[2½]**

ड) जागतिक तापमान वाढ **[2½]**

इ) 3 आर (3R) **[2½]**

फ) चिपको चळवळ **[2½]**

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Total No. of Questions : 5]

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S.Y. B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

CHNA - 331 : Network Fundamentals

(2019 Pattern) (CBCS) (Semester - IV) (Paper - III) (24871)

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) Define Intranet.

c) What is the purpose of HTTP?

d) Which is better co-axial cable or fiber optic cable?

e) Write the uses of STP cable.

f) Define Computer Network.

Q2) a) i) Write the advantages of peer-to peer Network. **[2]**

ii) Explain Ring Topology in short. **[4]**

b) What is the use of physical and logical topology? **[4]**

Q3) a) i) What is baseband and broadband transmission? **[2]**

ii) Explain about RAS server. **[4]**

b) What are different types of protocols? Explain it in short. **[4]**

P.T.O.

Q4) a) i) Explain different types of Networks. **[2]**

ii) What are the steps in installing a server operating system. **[4]**

b) Define protocol. Explain the different types of protocol's. **[4]**

Q5) Attempt any Four of the following (Short Notes) : **[4 × 2½ = 10]**

a) Web server

b) LAN (Local Area Network)

c) Router

d) Network Interface Card

e) Host

f) Simple mail transfer protocol

▽▽▽▽

Total No. of Questions : 5]

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S.Y.B.Sc. (Vocational)
COMPUTER HARDWARE AND NETWORK ADMINISTRATION
CHNA - 332 : Microprocessor & Interfacing - II
(CBCS 2019 Pattern) (Semester - IV) (Paper - IV) (24872) (Regular)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Qestion 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. **[5×1=5]**

a) Write fullform of WAN.

b) List different input devices.

c) Write two applications of card reader.

d) What is motherboard?

e) Write any one important function of peripheral controller.

f) What is fullform of MPEG?

Q2) a) Attempt the following.

i) What is Android? Where it is used? **[2]**

ii) List different peripheral controllers. Describe working of anyone controller. **[4]**

b) Explain the concept of speech recognition. **[4]**

P.T.O.

Q3) a) Attempt the following.

i) What is storage capacity of commonly used CD and DVD? **[2]**

ii) Explain the concept of Green PC. **[4]**

b) Explain working of printer as an output device. **[4]**

Q4) Attempt the following.

a) Explain in brief various types of storage devices available. Describe their features. **[6]**

b) Differentiate between synchronus and aynchronous serial data communication protocol. **[4]**

Q5) Write short note on any Four of the following. **[4×2.5=10]**

a) BIOS.

b) Multimedia PC.

c) RFID system.

d) Thick and Thin concept.

e) Computer Networks.

f) MPEG Standards.

Total No. of Questions : 5]

SEAT No. :

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[6154]-89
S.Y. B.Sc.
VOCATIONAL BIOTECHNOLOGY
VBT-221 : Genetic Engineering
(2019 Pattern) (CBCS) (Semester - IV) (Paper-III) (24571)

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) Enlist the selectable markers of YAC vector.

b) Write any one application of PCR.

c) What do you understand by clone?

d) Define expression vectors.

e) Enlist the enzymatic method of DNA sequencing.

f) What is a clone?

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

i) What do you understand by chain termination reaction? In the sanger's method of DNA sequencing, why does the new strand synthesis stop when dideoxyribonucleotide is added by DNA polymerase enzyme?

ii) With the help of an example, explain the concept of insertional in activation.

iii) What is a biopesticide? Explain the mechanism of action of cry protein on the digestive system of insects.

P.T.O.

b) Answer any one of the following. **[4]**

i) What are DNA ligases? Give their role is recombinant DNA technology.

OR

ii) Diagrammatically describe the particle gun method in detail.

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

i) What is DNA sequencing? Describe the pyrosequencing method of DNA sequencing.

ii) Define vectors. Describe the basic steps of gene cloning with the help of neat and well labelled diagram.

iii) Diagrammatically describe the BAC vector in detail.

b) Answer any one of the following. **[4]**

i) What are restriction enzymes? Describe the nomenclature of restriction endonucleases.

ii) With the help of neat and well labelled diagram, explain the procedure of Northern blotting.

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

i) Enlist the examples of any two restriction endonucleases along with its unique specific recognition sequence.

ii) Describe recombinant vaccines in detail.

iii) Write any three features of cosmids.

b) Answer any one of the following. **[4]**

i) What is PCR? Explain the basic steps involved in PCR.

ii) With the help of neat and well labelled diagram, describe any one non-radioactive labelling method in detail.

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

a) Role of any two chemicals used in Maxam - Gilbert method of DNA sequencing.

b) Applications of Western blotting.

c) Role of Primers in PCR.

d) Applications of recombinant DNA technology in industry.

e) Differences between expression vectors and cloning vectors.

f) Role of restriction enzymes and DNA ligases in recombinant DNA technology.

Total No. of Questions : 5]

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S.Y.B.Sc. (Vocational)

BIOTECHNOLOGY

VBt - 222 : Bioinformatics

(CBCS 2019 Pattern) (Semester - IV) (24572) (Regular) (Paper-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.***
3) ***Question 2 to 5 carry equal marks.***

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

a) What is Bioinformatics?

b) Name any two Nucleic Acid Databases.

c) Give full form of BLAST.

d) What is Prosite?

e) What are Protein databases?

f) What is secondary data?

Q2) A) Answer any Two of the following. **[6]**

a) Comment on Sanger as specalized database.

b) Give applications of structural and derived databases.

c) Comment your views on History of Bioinformatics.

B) Answer any one of the following.

a) What are servers? Explain servers using NAR databases. **[4]**

b) Write a note on bacterial genome database. Give its Significance.

P.T.O.

Q3) A) Answer any Two of the following. **[6]**

a) What is BLOSSUM series? Give its applications.

b) Explain in detail GeneBank.

c) What is SWISS-PROT? Give one example.

B) Answer any One of the following. **[4]**

a) Explain in detail PLOS. Give its application in field of Bioinformatics.

b) Explain in detail uses and application of PAM series.

Q4) A) Answer any Two of the following. **[6]**

a) What are the principles on which matrices are designed?

b) Elaborate on scoring matrices with any one suitable example.

c) Comment on viral Genome databases in Bio-informatics.

B) Answer any One of the following. **[4]**

a) Distinguish between BLAST and FASTA.

b) What are primary and secondary databases. Give their applications.

Q5) Write short Notes on the following (Any four). **[10]**

a) TREMBL

b) NDB

c) Pubmed

d) Paralogues

e) Protein sequences.

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Total No. of Questions : 5]

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[6154]-91
S.Y.B.Sc. (Vocational)
SEED TECHNOLOGY
ST - 2.4 : Vegetable Seed Production
(CBCS 2019 Pattern) (Semester - IV) (2 Credits) (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) ***Questions 2 to 5 carry equal marks.***

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

a) Which type of nursery bed is required for growing Brinjal seedlings?

b) What is hybridization?

c) What do you mean by CGMS?

d) What is seed storage?

e) Give the isolation distance for foundation seed production in Tomato?

f) Draw the digramatic representation for classifying the vegetable crops based on plant parts used for consumption.

Q2) a) Define microsporogenesis. Describe microspore formation process in detail with a neat labeled diagram. **[6]**

b) Describe in detail types of hybridization methods in vegetable crops.**[4]**

Q3) a) Classification of vegetable crops based on growing season. **[6]**

b) Explain pure line selection. **[4]**

P.T.O.

Q4) a) Explain in detail seed production in onion. **[6]**

b) Give an account of seed production in Brinjal with reference to land requirement isolation and plant protection. **[4]**

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

a) Objectives of population improvement.

b) Pollen vaibility.

c) Asexual reproduction.

d) Objectives of vegetable seed production.

e) Modes of pollination.

f) Mass selection.

Total No. of Questions : 5]

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S.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

ST-2.5 : Seed Quality Control

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

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) Write any one objective of field inspection.

b) Write the names of any two seed certification agencies.

c) Define foundation seed.

d) Define seed legislation.

e) Give any one duty of seed inspector.

f) Draw any one walking pattern in field inspection.

Q2) a) Write an account of seed certification agencies and its organization. **[6]**

b) Explain the standards for seed certification. **[4]**

Q3) a) Describe central seed testing laboratory. **[6]**

b) Explain seed legislation in India. **[4]**

Q4) a) Describe in detail the method of field inspection with suitable example. **[6]**

b) Describe any two agencies and statutory bodies established in India. **[4]**

P.T.O.

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

a) Concepts of seed quality.

b) Central seed committee.

c) Powers of seed inspector.

d) Specific crop standards.

e) Responsibilities of field inspector.

f) Appellate authority.

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Total No. of Questions : 5]

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[6154]-93
S.Y.B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
VOC - IND - IMB - 221 : Microbial Fermentations and Downstream Processing
(CBCS 2019 Pattern) (Semester - IV) (24821) (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) ***Questions 2 to 5 carry equal marks.***

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

a) State full form of XRD.

b) State application of mass Spectroscopy.

c) State application of Bioinoculants.

d) State an example of an Acetic acid producer.

e) Define Reverse osmosis.

f) Which microorganism is responsible for commercial production of vitamin B12?

Q2) a) Solve any two of the following. **[6]**

i) What is a cell press? Where is it used? Enlist any two different techniques of cell disruption.

ii) Draw a flow chart for Acetic acid production highlighting important details.

iii) Write a short note on purification of fermented products.

b) Draw a well-labelled diagram of Affinity chromatography. Discuss principle and working. **[4]**

P.T.O.

Q3) a) Solve <u>any two</u> of the following. **[6]**

i) What is sedimentation? How can it be used for purification of fermented products?

ii) Explain MALDI

iii) Explain applications of Ion exchange chromatography.

b) Draw a flow-chart depicting Amylase production. **[4]**

Q4) a) Solve <u>any two</u> of the following. **[6]**

i) Describe the technique of dialysis.

ii) Discuss the process of characteristic of fermented product.

iii) What is penicillin? Which microorganism is responsible for commercial penicillin production? At what pH is the penicillin fermentation carried out?

b) Explain downstream process of fermentation. **[4]**

Q5) Solve write short notes on <u>any four</u> of the following. **[10]**

a) Solvent precipitation.

b) Production of Single cell protein.

c) Limitations of Rotary vaccum Filters.

d) Advantages of multichamber bowl centrifuge.

e) Formulation of fermented product.

f) Advantages of Distillation.

Total No. of Questions : 5]

SEAT No. : ____

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S.Y.B.Sc.

INDUSTRIAL MICROBIOLOGY (Vocational Paper - IV)

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 3 questions from Q 2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***

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

a) Define 'Quality Assurance'

b) Fifth edition of Indian pharmacopoeia is published in year _____.

c) State the full form of ISI.

d) Give names of any two methods used for bioassay of vitamin B12.

e) Enlist QA tests recommended for packaged drinking water.

f) Anaerobic test organisms used in sterility tests are grown in which medium?

Q2) a) **Describe the following any two :**

i) Describe the advantages of FPO to industry. **[6]**

ii) Describe <u>in vivo</u> pyrogentest.

iii) Explain the bioassay used for antibiotic penicillin.

b) Explain BP in details. **[4]**

P.T.O.

Q3) a) **Explain the following any two :**

i) Describe the process of determining shelf life of cheese. **[6]**

ii) Describe in vitro carcinogenicity test.

iii) Explain the process of 'Monograph development'.

b) Describe the pharmaceutical CGMP proposed by WHO. **[4]**

Q4) a) **Discuss the following any two :**

i) Describe the use of AGMARK. **[6]**

ii) Describe the importance of toxicity tests.

iii) Explain the bioassay used for glutamic acid.

b) Describe the use of ISO standards to pharmaceutical industry. **[4]**

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

a) USP.

b) FDA Standards for health care products

c) Allergen testing of cosmetics

d) Soyabean casein digest

e) IP

f) Shelf life of bioinoculants.