Total No. of Questions : 4]

SEAT No. : ____

PC-1250

[Total No. of Pages : 3

[6327]-51
S.Y. B.Sc.
MATHEMATICS
MT - 241 : Linear Algebra
(2019 Pattern) (CBCS) (Semester - IV) (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]**

a) Find the solution set of $x - 4y + 7z = 5$.

b) Write (5, 10) as a linear combination of vectors (1, 0) and (0, 1) in $\mathbb{R}^2$.

c) Define dimension of a vector space.

d) Determine a basis for the row space of the matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$.

e) If rank of a matrix A is 4 then find rank of a matrix A^T.

f) Find the reflection of (5, 6) about the line $y = x$.

g) State dimension theorem for Linear transformation.

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

i) Let $S = \{u_1, u_2, \ldots, u_r\}$ be a set of vectors in $\mathbb{R}^n$. If $r > n$, then show that S is linearly dependent.

ii) Show that two vectors u_1 and u_2 in a vector space V are linearly dependent if and only if one of the vector is a multiple of the other.

P.T.O.

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

i) Find the solution of the system by operation on the rows of the augmented matrix,

$$x + y + z = 9$$

$$2x - 3y + 4z = 13$$

$$3x + 4y + 5z = 40$$

ii) Show that the system of equations

$$x + y + 2z = a$$

$$x + z = b$$

$$2x + y + 3z = c$$

is consistent only if $a + b = c$

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

i) Let V be a n-dimensional vector space ($n \geq 1$). Then show that any linearly independent subset of V with n elements is a basis.

ii) If $W \subseteq V$ is a vector subspace of a finite dimensional vector space V then

$$\dim (W) \leq \dim (V)$$

Moreover, dim (W) = dim (V) if and only if W = V

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

i) Show that the set of vectors

$$S = \{(1, 2, 0), (0, 3, 1), (-1, 0, 1)\}$$

is linearly independent in $\mathbb{R}^3$.

ii) Find a subset of the vectors that forms a basis for the space spanned by the vectors

$v_1 = (1, 0, 1, 1)$, $v_2 = (-3, 3, 7, 1)$, $v_3 = (-1, 3, 9, 3)$ and $v_4 = (-5, 3, 5, -1)$

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

i) Let the linear transformation T : V $\rightarrow$ W be injective and $\{v_1, v_2, ..., v_k\}$ be a set of linearly independent vectors in V.

Then show that $\{T(v_1), T(v_2), ..., T(v_k)\}$ is also linearly independent.

ii) Let T : V $\rightarrow$ W be a linear transformation. If T is an isomorphism then show that T maps linearly independent sets in V to linearly independent sets in W.

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

i) Let $T : \mathbb{R}^3 \rightarrow \mathbb{R}^2$ be the linear transformation given by T(x) = Ax, where x is in $\mathbb{R}^3$ and $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$. Find ker (T).

ii) Show that the function $T : \mathbb{R}^3 \rightarrow \mathbb{R}^2$ defined by T(x, y, z) = ($x, x + y + z$) is a linear transformation.

Total No. of Questions : 4]

SEAT No. : ____

PC-1251

[Total No. of Pages : 3

[6327]-52
S.Y. B.Sc.
MATHEMATICS
MT-242(A) : Vector Calculus
(2019 Pattern) (Semester - IV) (CBCS) (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) Evaluate $\lim_{t\to\infty}\left[\bar{e}^{t}\,\bar{i}+\left(\frac{2t+3}{3t-1}\right)\bar{j}\right]$

b) If $\bar{r}(t)=(t+1)\bar{i}+(t^2-1)\bar{j}$ is a position vector of a particle in XY plane at time 't' then find velocity of particle at t = 2.

c) Evaluate $\int_0^1 (2t\,\bar{i}+3t^2 j)dt$

d) State Green's theorem in the plane in normal form.

e) Find parametrization of the cone $Z=\sqrt{x^2+y^2}$, $0 \le Z \le 1$

f) State divergence theorem in three dimensions.

g) Find the gradient vector field of function $f(x, y, z) = x^2\sin 5y + 2z^2$

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

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

$$\frac{d}{dt}\left[\bar{u}(t)\times\bar{v}(t)\right]=\bar{u}(t)\times\frac{d}{dt}\bar{v}(t)+\frac{d}{dt}\bar{u}(t)\times\bar{v}(t)$$

P.T.O.

ii) Define the line integral of $\bar{F}$ along a smooth curve C and evaluate the line integral of $\bar{F}=3y\bar{j}+2x\bar{j}+4z\bar{k}$ along the curve C given by $\bar{r}(t)=t\bar{i}+t\bar{j}+t\bar{k}$, $0\le t\le 1$

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

i) Find arclength along the curve $\bar{r}(t)=(t\sin t+\cos t)\bar{i}+(t\cos t-\sin t)\bar{j}$ from $t=\sqrt{2}$ to t = 2

ii) Solve the initial value problem for $\bar{r}(t)$ where $\frac{d}{dt}\bar{r}(t)=(t^3+4t)\bar{i}+t\,\bar{j}+2t^2\bar{k}$ with initial condition $\bar{r}(0)=\bar{i}+\bar{j}$

Q3) a) Attempt any <u>one</u> of the following : **[5]**

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

ii) If $\bar{\text{F}}$ is a vector field and C is any closed curve in a region D then prove that the field $\bar{\text{F}}$ is conservative if and only if $\oint_C \bar{\text{F}}\cdot \text{d}\bar{\text{r}}=0$

b) Attempt any <u>one</u> of the following : **[5]**

i) Find the workdone by the force field $\bar{F}=x\bar{i}+y\bar{j}+z\bar{k}$ in moving an object along the curve C parametrized by $\bar{r}(t)=\cos(\pi t)\bar{i}+t^2\bar{j}+\sin(\pi t)\bar{k}$, $0\le \text{t}\le 1$.

ii) Integrate G(*x*, *y*, *z*) = x^2 over the cone $Z=\sqrt{x^2+y^2}$, $0\le Z\le 1$

Q4) a) Attempt any <u>one</u> of the following : **[5]**

i) Define curl of a vector field $\bar{F}$. Determine whether the field $\bar{F}=6x\bar{i}+(2y-y^2)\bar{j}+(6z-x^3)\bar{k}$ is conservative

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

b) Attempt any <u>one</u> of the following : **[5]**

i) Use divergence theorem to evaluate $\iint_S \bar{F} \cdot \bar{n}\, d\sigma$; where $\bar{F} = xi - y\bar{j} + (z^2 - 1)\bar{k}$ and S is the cylinder formed by the surface $z = 0$, z = 1 and $x^2 + y^2 = 4$

ii) Use Stoke's theorem to evaluate $\iint_S \left(\nabla \times \bar{F}\right) \cdot \bar{n} d\sigma$ for the field $\bar{F} = y\bar{i} - x\bar{j}$ over the hemisphere S = $x^2 + y^2 + z^2 = 9$, Z $\geq$ 0

Total No. of Questions : 4]

SEAT No. :

PC-1252

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S.Y. B.Sc.

MATHEMATICS

MT-242(B) : DYNAMICAL SYSTEMS

(2019 Pattern) (CBCS) (Semester - IV) (Paper - II) (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) Write the given second order differential equation as a system of first order differential equation.

$2x'' - 5x' + x = 0$, $x(3) = 6$, $x'(3) = -1$.

b) If trace of matrix A is -1 and determinant of matrix A is -15 then determine the nature of the eigen values.

c) Find the rank of the matrix A, where $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 6 & 9 \\ 2 & 4 & 6 \end{bmatrix}$.

d) Find the characteristic equation of the matrix $A = \begin{bmatrix} 3 & 0 \\ 8 & -1 \end{bmatrix}$.

e) Find all equilibrium points for the differential equation $x'(t) = x^3 - 3x$.

f) Find the general solution of the system $\frac{dx}{dt} = ax(t)$.

g) Find the trace of the matrix A where $A = \begin{bmatrix} 1 & 4 & 7 \\ 2 & -1 & 0 \\ 4 & 9 & 3 \end{bmatrix}$.

P.T.O.

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

i) 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 $\det \begin{pmatrix} v_1 & w_1 \\ v_2 & w_2 \end{pmatrix} \neq 0$.

ii) Suppose A is n × n matrix and if A is diagonalizable then prove that A has n linearly independent eigenvectors.

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

i) Find the eigenvalues and eigen vectors of the matrix $A = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$.

ii) For the differential equation $x^1 = x^3 - x$, find all equilibrium solutions and determine if they are sinks, sources or neither. Also sketch the phase line.

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

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

ii) Suppose that V_0 is an eigen vector for the matrix A with associated eigen value λ, then prove that the function $x(t) = e^{\lambda t} v_0$ is a solution of the system X′ = AX.

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

i) Find the straight line solution of X′ = AX where $A = \begin{bmatrix} 1 & 2 \\ 3 & 6 \end{bmatrix}$.

ii) Find the canonical form of matrix A, where $A = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}$.

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

i) Prove that the 2×2 matrix T is invertible if and only if $\det(T) \neq 0$.

ii) If A, B and T be $n \times n$ matrices then prove that

I) If $B = T^{-1}AT$ then $\exp(B) = T^{-1}\exp(A)T$

II) If $AB = BA$ then $\exp(A + B) = \exp(A).\exp(B)$.

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

i) Find the exponential form of the matrix $A = \begin{bmatrix} 5 & -6 \\ 3 & -4 \end{bmatrix}$.

ii) Identify whether the equilibrium point (0, 0) is a sink, source, centre, saddle or spiral of $x' = AX$ if $A = \begin{bmatrix} -3 & -2 \\ 5 & 2 \end{bmatrix}$.

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Total No. of Questions : 5]

SEAT No. :

PC-1253

[Total No. of Pages : 2

[6327]-54

S.Y. B.Sc. (Regular)

PHYSICS

PHY - 241 : Oscillations, Waves and Sound

(2019 Pattern) (CBCS) (Semester - IV) (24121) (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) ***Questions 2 to 5 carry equal marks.***
4) ***Use of calculator and logtable is allowed.***
5) ***Figures to the right indicate full marks.***

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

a) What is stable equilibrium?

b) What is log decrement?

c) Define quality factor.

d) Define reverberation time.

e) The frequency of damped oscillator of mass 3 gm is 5 Hz. If the coefficient of damping is 0.314 dyne/cm-5^{-1}, determine its Q value.

f) Calculate the change in intensity level when the intensity of sound increases by 100 times the original intensity.

Q2) a) Set up the differential equation for damped electrical oscillations and hence obtain an expression for the frequency of oscillations. **[6]**

OR

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

b) Explain electrical method to demonstrate Lissajous figures. **[4]**

P.T.O.

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 the tension. **[6]**

OR

Show that the Doppler effect in sound is asymmetric.

b) The equation for critically damped motion is given in the form $7.5\left(\frac{d^2x}{dt^2}\right) + R\left(\frac{dx}{dt}\right) + 30x = 0$ Determine the value of R. **[4]**

Q4) a) Give an analytical treatment for composition of two SHMs perpendicular to each other and having their frequencies in the ratio 1 : 1. Discuss the cases when the phase difference is π and $\frac{\pi}{2}$ radians. **[6]**

OR

Obtain the expression for average power absorbed during the forced oscillations.

b) The equation of wave travelling over a string is $y = (0.20\text{ mm}) \sin [(31.4\text{ m}^{-1})x + (314\text{ S}^{-1})t]$ **[4]**

i) In which direction does the wave travel.

ii) Find wave speed, frequency and the wavelength of the wave

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

a) Red shift

b) Neutral equilibrium

c) Damped oscillatory motion

d) Forced oscillations

e) Transverse waves

f) Quality of sound

Total No. of Questions : 5]

SEAT No. : ____

PC-1254

[Total No. of Pages : 2

[6327]-55
S.Y. B.Sc.
PHYSICS
PHY - 242 : OPTICS (Paper - II)
(2019 Pattern) (CBCS) (Semester - IV) (24122)

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.***
4) ***Use of calculators and logtable is allowed.***
5) ***Figures to the right indicate full marks.***

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

a) Define power of lens.

b) Two thin lenses of focal lengths 10 cm & 6 cm are placed co-axially at a certain distance. Calculate distance between the lenses if they form an achromatic combination.

c) What is an eyepiece?

d) Define grating element.

e) What are the limitations of simple microscope?

f) State law of Malus.

Q2) a) Show that the distance of the second principal plane from the second lens of an optical system is $\beta = \frac{-xf}{f_1}$. **[6]**

OR

Obtain condition $2\mu t \cos r = m\lambda$ for destructive interference in the reflected system of rays from a parallel sided thin film.

b) Explain construction and working of Ramsden's eye-piece. **[4]**

P.T.O.

Q3) a) Give the theory of plane transmission grating. Discuss the condition under which principal maxima will occur. **[6]**

OR

Prove the relation $\lambda = \frac{D_m^2 - D_n^2}{4(m-n)R}$

where symbols have their usual meaning.

b) A radii of curvature of two surfaces of a lens are 30 cm & 40cm respectively and refractive index 1.5. Find the focal length of the lens if it is i) Double convex ii) Double concave. **[4]**

Q4) a) Draw a ray diagram of compound microscope find an expression for its magnifying power. **[6]**

OR

Derive the lens makers formula for a thin lens.

b) A parallel beam of light of wavelength 5890Å is incident on a thin film of refractive index 1.5 such that the angle of refraction into the thin film is 60º. Calculate the smallest thickness of the film which will make it appear dark by reflection. **[4]**

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

a) Fraunhoffers Diffraction

b) Cardinal points

c) Huygen's Eye-piece

d) Nicol Prism

e) Distortion

f) Rayleigh's criterion

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

PC-1255

[Total No. of Pages : 2

[6327] - 56
S.Y. B.Sc.
CHEMISTRY
Physical and Analytical Chemistry
(24131) (2019 Pattern) (Semester - IV) (CBCS))CH - 401) (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.***
4) ***Use of calculators and log tables are allowed.***
5) ***Figures to the right indicate full marks.***

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

a) Define degree of freedom of a system.

b) Define Ideal solution.

c) State Lamberts Law

d) Calculate cell constant of the cell, if the length of the conductivity cell is 2.2 cm and area of cross section is 4.0 cm^2.

e) Define stationary phase

f) State Raoult's Law.

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

i) Explain different types of equilibrium involved in phase rule.

ii) Explain different ways of expressing concentrations of solution.

iii) What is specific conductance and equivalent conductance, explain the effect of dilution on specific conductance

B) Discuss the construction and working of photomultiplier tube. **[4]**

P.T.O.

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

i) Explain purification of water by ion exchange chromatography

ii) Discuss the phase diagram of sulphur system

iii) What are azeotropic mixtures? Explain with example.

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

i) Resistance of 0.25N kcl Solution at 298 K is 200 ohm. calculate conductance of the solution.

ii) Calculate the molar absorptivity of 0.04M solution having 65% transmittance at 450 nm. pathlength of the cell is 1.5 cm.

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

i) Discuss the phase diagram of carbondioxide system

ii) Explain the principle of column chromatography with one example.

iii) Discuss with the help of a neat diagram the effect of temperature on solubilities of Aniline in water.

B) What is the equivalent conductance at infinite dilution of CH_3COOH, if 91.00, 426 and 126 mho cm^2 are equivalent conductances of CH_3COONa, HCl and NACl at infinite dilutions respectively, **[4]**

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

i) Metastable equilibrium

ii) Chemical potential of liquids

iii) Interference filters

iv) Column packing materials

v) Ion Exchange equilibria

vi) Kohlrausch's law of independent migration of ions.

Total No. of Questions : 5]

SEAT No. : ____

PC-1256

[Total No. of Pages : 2

[6327]-57

S.Y. B.Sc.

CHEMISTRY

CH - 402 : Inorganic and Organic Chemistry

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

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) ***Figures to the right indicates full marks.***

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

a) Identify the isomerism in following inorganic complexes.
$[CO(en)_2 (H_2O)Cl]$ and $[CO(en)_2Cl_2]$ Cl. H_2O

b) What is Hybridization of $[Cr(H_2O)_6]^{3+}$?

c) Find the number of unpaired electrons in d^8 strong field octahedral complex.

d) What is Rosenmand Reduction?

e) What are Carboxylic acid?

f) Why amines are basic in nature?

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

i) Draw Cis and trans isomers of $[CO(NH_3)_3 Cl_3]$

ii) Explain the bonding in $[MnCl_4]^{2-}$ Complex ion.

iii) Calculate CSFE of Cr^{2+} ion in strong octahedral field. (Atomic number of Cr = 24)

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

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

ii) Write note on "Locking of conformation"

P.T.O.

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

i) Draw the structure of following compounds

A) 3-amino hexane

B) 5-methyl amino hexane

C) 2-methyl amino butane

ii) Explain benzoin condensation.

iii) What is haloform reaction? Which of the following gives positive iodoform test?

A) Acetaldehyde B) 3-Pentanone

b) Discuss the Factor affecting the magnitude 10 Dq or Δ_0. **[4]**

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

i) Give assumption and limitations of valence bond theory.

ii) Give the classification of carboxylic acid.

iii) Explain Reformatsky reaction.

b) Calculate CFSE for d^7 ion in weak and strong octahedral field. **[4]**

Q5) Attempt <u>any Four</u> of the following. **[10]**

a) Explain the Splitting of 'd' orbital in tetrahedral ligand field complex.

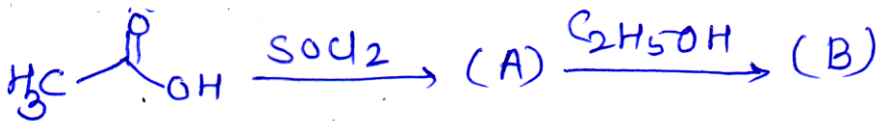
b) Write the spin only formula and calculate magnetic moment of the following complexes.

i) $[Ni(NH_3)_6]^{2+}$ ii) $[FeF_6]^{3-}$

[Atomic Number of Ni = 28, Atomic number of Fe = 26]

c) Explain the bonding structure of $[CO(CN)_6]^{3-}$ Complex ion and comment on their magnetic properties [At.No of CO=27]

d) Identify the product 'A' and 'B' and rewrite the reaction.



e) Draw conformation of methyl cyclohexane and comment on their stability.

f) How will you convert following conversion.

i) Aniline to m-nitro aniline

ii) P-nitro aniline to P-nitro phenol

Total No. of Questions : 5]

SEAT No. : ____

PC-1257

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[6327]-58
S.Y. B.Sc.
BOTANY - I
BO - 241 : Plant Anatomy and Embryology (Paper - I)
(2019 Pattern) (CBCS) (Semester - IV) (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 plant anatomy.

b) What is epidermal tissue system?

c) What is mechanical tissue system?

d) Define plant embryology.

e) What is ategmic ovule?

f) What is self pollination?

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

b) Describe bisporic embryo Sac. **[4]**

Q3) a) What is microsporogenesis? Explain any two types of microspore tetrads. **[6]**

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

P.T.O.

Q4) a) Explain the structure of typical monocot and dicot stomate. **[6]**

b) Describe the process of double fertilization. **[4]**

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

a) Inextensibility

b) Scope of plant anatomy in plant physiology

c) Helobial endosperm

d) Amphitropous ovule

e) Dicot embryo

f) Mesogamy

▽▽▽▽

Total No. of Questions : 5]

SEAT No. : ____

PC-1258

[Total No. of Pages : 2

[6327]-59
S.Y. B.Sc.
BOTANY - II
BO - 242 : Plant Biotechnology
(2019 Pattern) (CBCS) (24142) (Semester - IV) (Paper - II)

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 Questions 5 carry equal marks.***
4) ***Figures to right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

Q1) **Attempt <u>any Five</u> of the following :** **[5]**

a) What is GMO?

b) Define bioremediation.

c) What is Sterilization?

d) Name any two tissue culture laboratories.

e) Enlist any two nonrenewable energy sources.

f) Define SCP.

Q2) a) Describe applications of Protoplast Fusion. **[6]**

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

Q3) a) Describe applications of genetic engineering with respect to insect pest resistance. **[6]**

b) Explain the production of SCP from <u>spirulina</u>. **[4]**

Q4) a) Describe concept of genomics. **[6]**

b) Explain process of hardening in tissue culture. **[4]**

P.T.O.

Q5) **Write a short note on <u>any Four</u> of the following.** **[10]**

a) Callus culture.

b) Importance of SCP.

c) Restriction enzyme.

d) Importance of plant biotechnology.

e) Bioinformatics.

f) Phytoremediation.

▽▽▽▽

Total No. of Questions : 5]

SEAT No. :

PC-1259

[Total No. of Pages : 2

[6327] - 60
S.Y. B.Sc.
ZOOLOGY
ZO-241: Animal Diversity - IV
(2019 Pattern) (Semester - IV) (CBCS) (24151) (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) Write any one digestive gland of rat

b) Write any two examples of class Reptilia

c) Write any one habit of rat

d) Give any one example of fruit eating beak

e) Write any two examples of class mammalia

f) Give any one example of raptorial feet

Q2) a) Describe the alimentary canal of rat. **[6]**

OR

Describe in brief Flight adaptations in birds.

b) Write in brief about egg laying mammals. **[4]**

P.T.O.

Q3) a) Describe in brief desert adaptations in reptiles **[6]**

OR

Describe the male reproductive system of rat.

b) Describe the structure of ear of rat. **[4]**

Q4) a) Sketch and label internal structure of heart of rat. **[6]**

OR

Sketch and label dorsal view of brain of rat.

b) Describe the salient features of class Mammalia. **[4]**

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

a) Latitudinal migration in birds

b) Systematic position of rat

c) Functions of brain in rat

d) Lungs of rat

e) Sexual dimorphism in rat

f) Cobra Snake

Total No. of Questions : 5]

SEAT No. : ____

PC-1260

[Total No. of Pages : 2

[6327] - 61
S.Y. B.Sc.
ZOOLOGY (Theory)
ZO-242: Applied Zoology - II
(CBCS) (2019 Pattern) (Semester - IV) (24152) (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 brackish water fisheries.

b) Define Swarming.

c) Define craft.

d) Give any two predators of honey bee.

e) Give use of hive tool.

f) Give biological name of Garden bee.

Q2) a) Explain Division of labour in honey bee. **[6]**

OR

Describe habit, habitat and culture methods of Mrigal.

b) Explain Wax moth as a bee pest. **[4]**

P.T.O.

Q3) a) Describe harvesting method of Harpodon and Mackerel. **[6]**

OR

Explain Round dance and Wagtail dance in honey bee.

b) Explain Smoker. **[4]**

Q4) a) Give uses of honey and bee venom. **[6]**

OR

Describe Rampani net and Gill net.

b) Describe salting as fish preservation techniques. **[4]**

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

a) Bee Pollination

b) Fish flour

c) Honey extractor

d) Habit and habitat of Apis Indica

e) Freezing as fish preservation technique.

f) Fresh water fisheries

Total No. of Questions : 5]

SEAT No. : ____

PC-1261

[Total No. of Pages : 2

[6327] - 62
S.Y. B.Sc.
GEOLOGY
GL-221: Global Tectonics and Geodynamics of Lithosphere
(2019 Pattern) (Semester - IV) (Paper - II) (241616)

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 the following question in 2-3 line (any five) one mark each : **[5]**

a) What is Isostacy?

b) What is meant by 'shield'?

c) What is LVZ

d) What is meant by 'Plate'?

e) What is M.O.R.?

f) Enlist type of plate boundaries

Q2) **Answer the following :**

a) Define Isostacy. Explains isostatic equilibrium **[6]**

b) Explain shield and platform **[4]**

P.T.O.

Q3) **Answer the following :**

a) Explain physical properties of crust and mantle **[6]**

b) Give morphology of ocean floor. **[4]**

Q4) **Answer the following :**

a) Explain crustal evolution of Earth. **[6]**

b) Explain Low velocity zone **[4]**

Q5) **Write short notes on any four (2.5 marks each) :** **[10]**

a) Mobile Belt

b) Geotherms

c) Wilson's cycle

d) Mesosphere

e) Plate boundaries

f) Continental crust

Total No. of Questions :5

SEAT No. : ____

PC-1262

[Total No. of Pages : 2

[6327]-63
S.Y. B.Sc.
GEOLOGY
GL - 222 : Environmental Geology and Geogenic Disasters
(24162) (2019 Pattern) (Regular) (Paper - II) (Semester - IV)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any <u>THREE</u> questions from Q2 to Q5.***
3) ***Question No. 2 to 5 carry equal marks.***

Q1) **Answer the following question in 2 - 3 lines (Any Five) :** **[5]**

a) What is meant by bio-geochemical cycles?

b) What is meant by fluorosis?

c) Define flood.

d) What is meant by technological approaches?

e) What is 'Richter Scale'?

f) Define agricultural drought.

Q2) **Answer the following :**

a) Explain land-use planning approaches to avoid flood damages. **[6]**

b) Explain B.T.S. standards of drinking water. **[4]**

Q3) **Answer the following :**

a) Explain different types of droughts and mitigation measures. **[6]**

b) Explain surface and sub-surface water resources. **[4]**

P.T.O.

Q4) **Answer the following :**

a) What is hazard zonation map? Explain significance of geology in disaster management plan for earthquakes. **[6]**

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

Q5) **Write notes on <u>any five</u> of the following:** **[10]**

a) Water quality parameters

b) Arsenic poisoning

c) Natural hazard zones

d) Scope of Environmental Geology

e) Building code

f) Impact assessment evolution

Total No. of Questions : 4]

SEAT No. :

PC-1263

[Total No. of Pages : 3

[6327]-64

S.Y.B.Sc.

ST-241: STATISTICS

Tests of Significance and Statistical Methods

(CBCS) (2019 Pattern) (Paper - I) (Semester - IV) (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: **[1 each]**

A) In each of the folllowing cases, choose the correct alternative:

i) Type II error is

a) Accepting H_0 when it is true

b) Rejecting H_0 when it is true

c) Accepting H_0 when it is flase

d) Rejecting H_0 when it is false

ii) The partial correlation coefficient lies between

a) 0 to 1 b) –1 to 1

c) 0 to ∞ d) $-\infty$ to ∞

iii) The ratio of Curde Birth Rate to Crude Death Rate is

a) Pearl's vital index

b) Crude rate of natural increase

c) Net Reproduction Rate

d) Gross Reproduction Rate

P.T.O.

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

i) Is the maximum correlation between Y and the linear combination of and.

ii) If NRR>1 then there is decrease in population.

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

a) Define the terms :

i) Parameter

ii) Statistic

iii) Level of significance

iv) Test statistics

v) Critical region

b) Show that $X_{1.23}$ is uncorrelated with X_2 and X_3.

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

i) Average queue length.

ii) Expected waiting time in the queue.

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

a) Derive the equation of regression plane of Y on X_1 and X_2.

b) A random sample of 200 bolts manufactured by machine A and 100 bolts manufactured by machine B showed 19 and 5 are defective bolts respectively. Is machine B better than machine A? Use 5% level of significance.

c) Explain Gross Reproduction Rate and Net Reproduction Rate with interpretations.

Q4) Attempt any one of the following:

a) i) Derive the formula for multiple correlation coefficient of Y on X_1 and X_2. (i.e.) in terms of total correlation coefficient. **[5]**

ii) Sample of 256 bricks has mean weight of 2.12 kg. with standard deviation of 560 gm. Test the hypothesis that the sample come from a population with mean weight of 2 kg. Use 5% level of significance. **[4]**

iii) Define infant mortality rate. **[1]**

b) i) Calculate G.F.R., A.S.F.R., and T.F.R., for the following data. **[4]**

Age - group	Number of women (in thousands)	Number of births
15 - 25	8	56
25 - 35	10	100
35 - 45	12	84
45 - 55	6	36

ii) Explain how to construct a $100(1 - \alpha)\%$ confidence interval for population mean (μ) of normal distribution when standard deviation (σ)is known, while testing $H_0: \mu = \mu_0$ against $H_1 : \mu \neq \mu_0$ **[4]**

iii) Define the terms : **[2]**

A) Waiting time in queue

B) Time spent in system.

Total No. of Questions : 4] **SEAT No. :**

PC-1264 **[Total No. of Pages : 2**

[6327]-65
S.Y. B.Sc. (Regular)
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 complusory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of Statistical tables and calculator is allowed.***
4) ***Symbals and abbreviations have their usual meaning.***

Q1) Attempt each of the following: **[1 each]**

a) In each of the following cases, choose the correct alternative:

i) Let $X \rightarrow$ Gamma (1,4) then E (X)

A) ¼ B) 4

C) ½ D) **2**

ii) Let X and Y are independent Chi- square random variable with 9 and 7 degrees of freedom respectively. The distibution $X + Y$

A) Chi- square with 2 degrees of freedom

B) Chi - square with 18 degrees of freedom

C) Chi - square with 16 degrees of freedom

D) Chi - square with 14 degrees of freedom.

iii) Let X follows t - distribution with 10 degrees of freedom then mode of X is

A) 10 B) $\frac{1}{10}$

C) 1 D) 0

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

i) t- distribution is leptokurtic.

ii) paired t-test is used to test the effectiveness of a training program where observations before and after training are recorded.

P.T.O.

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

a) State and prove additive property of Gamma distribution .

b) Let X follows F- distribution with n_1 and n_2 degrees of freedom. Find distribution of random variable $\frac{1}{x}$

c) Describe the test procedure for testing $H_0 : \sigma^2 = \sigma^2_0$ against $H_1 : \sigma^2 \neq \sigma^2_0$, where σ^2 denotes variance of normal population.

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

a) Let $X_1, X_2, \ldots X_n$ be independent and identically distributed Gamma $(\theta,1)$ random varibles. Find distribution of random variable $\sum_{i=1}^{n} X_i$

b) Let $X_1, X_2, \ldots X_{10}$ be independent and identically distributed N (5,100) random variates. Calculate $P\left[\overline{X} \geq 4, \sum_{i=1}^{10}(X_i - \overline{X})^2 \geq 72.67\right]$.

c) Let X follows Student's distribution with n degrees of freedom. Obtain central moment of order $2r + 1$ (μ_{2r} +1). Hence comment on symmetry of X.

Q4) Attempt any one of the following : **[10]**

a) i) Let $X_1, X_2, \ldots X_n$ be i.i.d. N(0,1) variates. Obtain the moment generating function of $Y = \sum_{i=1}^{n} X_i^2$. Identify the distribution of Y. **[5]**

ii) Prices of share of a company on 8 days in a month were found to be

75,77,78,69,70,72,65,67.

Test whether the mean price of share is 69. Use 5% level of significance. **[5]**

b) i) Let $X_1, X_2, \ldots X_{n1}$ and $Y_1, Y_2, \ldots Y_{n2}$ be a random from from N (μ_1, σ^2) and N (μ_2, σ^2). Construct a 100 $(1-\alpha)$% confidence interval for $\mu_1 - \mu_2$. **[4]**

ii) Derive an expression for r^{th} raw moment of F - distribution with n_1 and n_2 degrees of freedom. Hence find first raw moment of the distribution. **[6]**

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Total No. of Questions : 5]

SEAT No. :

PC-1265

[Total No. of Pages : 2

[6327]-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) ***Q. 1 is complusory.***
2) ***Attempt any three questions from Q.2 to Q.5.***
3) ***Questons 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) Define 'Environment Impact Assessment.

b) What is forest conservation?

c) What is sustainable development?

d) Write the objectives of environmental management.

e) Define term wild life.

f) Write any two principles of environmental protection in the stockholm declaration.

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

i) Describe the definition and importance of water conservation.

ii) Explain various principles of environmental planning.

iii) Write any three provisions made in Forest Conservation Act 1980.

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

i) Explain causes of deforestation.

ii) Explain the steps in Environment Impact Assessment.

P.T.O.

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

i) Explain the role of Government in environmental conservation in India.

ii) Explain the various activities of tiger conservation in India.

iii) Describe Delphi method of Environment Impact Assessment.

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

i) Explain the Kyoto protocol.

ii) Write the importance of study of environmental geography.

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

i) Write the importance of Forest conservation.

ii) Explain the concept of environmental planning.

iii) Explain any one policies in developed countries in environmental programme.

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

i) Describe the stockholm conference - 1972.

ii) Explain approaches of environmental management in detail.

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

a) Earth summit, Rio de Janeiro - 1992

b) Aspects of environmental management

c) Wildlife (Protection) Act - 1972

d) Water conservation with respect to Ganga action plan.

e) Solid waste management.

f) Nature of Environment Impact Assessment.

Total No. of Questions :5

SEAT No. :

PC-1266

[Total No. of Pages : 2

[6327]-67
S.Y. B.Sc.
GEOGRAPHY - II
GG - 242 : Geography of Maharashtra (Human) - II
(CBCS) (2019 Pattern) (Semester - IV) (Paper - II) (24182)

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.***
4) ***Use of map stencil is allowed.***

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

a) What is the rank of Maharashtra in the population growth in India?

b) Name the Express Highway which connects Mumbai and Nagpur?

c) Which mode of transportation is fastest?

d) Write two names of agro based industry?

e) Where the IT centers are concentrated in Maharashtra?

f) Write two names of food crops?

Q2) a) **Answer the following questions in 100 words (Any 2) :** **[6]**

i) Describe the Geographical requirement of cotton?

ii) Explain IT industry in Maharashtra?

iii) Explain the causes of Rural to Urban migration?

b) **Answer the following question in 150 words (Any 1):** **[4]**

i) Explain population distribution in Maharashtra?

ii) Write problems of wine industry in Maharashtra?

P.T.O.

Q3) a) **Answer the following questions in 100 words (Any 2) :** **[6]**

i) Why urban to urban migration occur in Maharashtra?

ii) Describe Geographical requirement of onion?

iii) Explain role of print media in Maharashtra?

b) **Answer the following question in 150 words (Any 1) :** **[4]**

i) Give account of major industries in Maharashtra?

ii) Which are the favourable factor's for productions of sugarcane in Maharashtra?

Q4) a) **Answer the following questions in 100 words (Any 2) :** **[6]**

i) Write distribution of Rice in Maharashtra?

ii) Which factors are favorable for IT industry in Maharashtra?

iii) Why social media is developing now a days?

b) **Answer the following question in 150 words (Any 1) :** **[4]**

i) Write salient features of Express Highway?

ii) Explain spatial distribution of population in Maharashtra?

Q5) **Write a short notes on the following (Any 4) :** **[10]**

a) Railway Transportation

b) IT industry

c) Bajra Crop

d) MIDC

e) Electronic media

f) Population growth

Total No. of Questions : 5]

SEAT No. : ____

PC-1267

[Total No. of Pages : 2

[6327]-68
S.Y.B.Sc. (Regular)
MICROBIOLOGY
MB - 241: Bacterial Genetics
(CBCS) (2019 Pattern) (Semester - IV) (Paper -1) (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 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 × 1 = 5]**

a) Define Mutagens.

b) Thymine is replaced by which nitrogen base in RNA?

c) What are different forms of DNA?

d) What is the function of DNA helicase?

e) What is silent mutation?

f) A codon contains how many nucleotides?

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

a) i) What is the role of DNA Polymerase in DNA replication? Explain leading strand.

ii) Explain reversion mutations by giving one example.

iii) What are 'R' plasmids?

b) Diagrammatically explain different models of DNA replication. **[4]**

P.T.O.

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

a) i) Enlist the six basic rules of DNA replication.

ii) Transition and transversion.

iii) Mutagenesis by Alkylating agents.

b) With the help of a diagram describe griffith experiment **[4]**

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

a) i) Theta model of DNA replication

ii) Mutagenesis by 5-bromouracil.

iii) Initiation of transcription.

b) With the help of a diagram describe hershey and chase experiment. **[4]**

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

a) Polynucleotides chain

b) Initiation of DNA replication

c) 'B' form of DNA

d) HNO_2 as mutagen

e) 'Rho' dependent termination of transcription.

f) Ionizing radiation.

Total No. of Questions :5

SEAT No. : ____

PC-1268

[Total No. of Pages : 2

[6327]-69
S.Y. B.Sc.
MICROBIOLOGY
MB - 242 : Air, Water and Soil Microbiology
(CBCS) (2019 Pattern) (Paper - II) (Semester - IV) (24192)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any THREE questions from Q2 to Q5.***
3) ***Questions No. 2 to 5 carry equal marks.***
4) ***Draw neat labelled diagram wherever necessary.***
5) ***Figures to the right indicate full marks.***

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

a) Define: Droplet

b) Write the names of two chemicals used in air sanitation.

c) What is distilled water?

d) Write the names of any two physical methods of water purification.

e) Write the use of Trichoderma harzianum

f) State whether true or false: Pseudomonas aeruginosa is a common example of coliform.

Q2) **Answer the following :**

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

i) Write any three air borne diseases with their causative agents and symptoms.

ii) Explain the water purification using potassiun aluminium sulfate.

iii) Explain symbiotic interactions in microorganisms with suitable examples.

b) Explain confirmed test for bacteriological analysis of potable water. **[4]**

P.T.O.

Q3) **Answer the following :**

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

i) Explain centrifugation method used for air sampling.

ii) Explain the effects of rhizosphere microflord on the plant growth.

iii) Write the functions of MPCB.

b) Explain the role of microorganisms in each step of nitrogen cycle. **[4]**

Q4) **Answer the following :**

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

i) Explain the transient nature of air flora.

ii) Write the advantages and disadvantages of MPN test.

iii) Explain about different types of composting.

b) Write the characteristics of ideal fecal pollution indicators. Explain the inherent problems of using E. Coil as Fecal pollution indicator. **[4]**

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

a) Andersen air sampler

b) Demineralized water

c) Water borne infections

d) Humus formation

e) Bacillus thuringiensis as bacterial insecticide

f) Bacteriological quality of drinking water suggested by BIS.

Total No. of Questions :5

SEAT No. : ____

PC-1269

[Total No. of Pages : 2

[6327]-70

S.Y. B.Sc. (Nanoscience and Nanotechnology)

NS - 241 : Organic and Polymer Science of Nanomaterials

(2019 Pattern) (Semester - IV) (24261)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any 3 questions from Q2 to Q5.***
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]**

a) What is Emulsion Polymerisation?

b) Give any two properties of carbon nanotubes.

c) Give the name of multiwalled nanotubes mode.

d) What is graphene oxide?

e) Give the formula of molecular weight of polymer.

f) Give the types of nanocomposites.

Q2) a) Explain in detail cataionic polymerisation. **[6]**

OR

Give the classification of conducting polymerisation.

b) Give the applications of the fire retardant thermally stable polymer. **[4]**

Q3) a) Explain growth mechanism of carbon nanotubes. **[6]**

OR

Give the classification of conducting polymer.

b) Explain the term - Nanocomposites and Nanofillers. **[4]**

P.T.O.

Q4) a) Explain the extrinsically conducting polymer. **[6]**

OR

Explain the properties of graphene.

b) What is Nanofillers? Explain it's classification. **[4]**

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

a) Nanofillers.

b) Polymerisation.

c) Types of Carbon Nanotubes.

d) Emulsion Polymerisation.

e) Bio-degradable polymer.

f) Intrinsic conducting polymer.

Total No. of Questions : 5]

SEAT No. : ____

PC-1270

[Total No. of Pages : 2

[6327] - 71
S.Y. B.Sc.
NANOSCIENCE AND NANOTECHNOLOGY
NS 242: Advanced Techniques for Characterization of Nanomaterials
(2019 Pattern) (Semester - IV) (Paper - II) (24262)

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) ***Draw neat and labelled diagram wherever necessary.***
5) ***Figures to the right indicate full marks.***

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

a) Draw the diagram of bright field imaging mode.

b) Define ion milling process.

c) State any two limitations of SEM.

d) Define elastic and inelastic scattering.

e) Enlist the parts of EDAX system.

f) State the principle of VSM.

P.T.O.

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

A) a) Define Josephson junction. Also explain SQUIDs

b) Draw a neat diagram of Fluorescence microscope & give its advantages.

B) Explain dark field imaging of TEM. **[4]**

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

A) a) Write down the applications of SEM & TEM.

b) With neat labeled diagram explain working of Environmental SEM.

B) Explain HRTEM method. **[4]**

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

A) a) Explain DSC-Chemiluminescence. system & DSC-Photo calorimetry system.

b) With neat diagram explain scanning electron Microscopy.

B) Explain biological sample preparation for the SEM. **[4]**

Q5) **Write a short note on any four of following :** **[10]**

a) Principle of DSC analysis technique

b) Fluorescent substances.

c) Applications of EDAX.

d) Applications of confocal microscopy.

e) DC SQUIDs & RF SQUIDs.

f) Principle of FESEM.

Total No. of Questions : 5]

SEAT No. : ____

PC-1271

[Total No. of Pages : 2

[6327] - 72
S.Y. B.Sc.
ELECTRONIC SCIENCE
EL 241: Analog Circuit Design
(2019 Pattern) (Semester - IV) (Paper - I) (24221)

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 Q2 to Q5 carry equal marks.***

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

a) Define Bode plot.

b) What is the efficiency of class-B push-pull amplifier?

c) What is positive feedback?

d) Define class-A amplifier.

e) What is thermal runway?

f) What is the use of coupling capacitor in multistage amplifier?

Q2) Answer the following:

a) i) Draw a DC load line for transistor amplifier where V_{cc}=9V, R_c=1KΩ, R_E =2KΩ. **[2]**

ii) Write a note on classification of power amplifier **[4]**

b) Draw a block diagram of function generator and explain it. **[4]**

P.T.O.

Q3) Answer the following:

a) i) In wein bridge oscillator if the resistors in the series and shunt arms are 220KΩ and capacitor of 250 pF, determine frequency of oscillation. **[2]**

ii) Define heat sink, explain active & passive heat sink **[4]**

b) With neat circuit diagram explain working of first order active low pass butterworth filter. **[4]**

Q4) Answer the following:

a) i) Draw a block diagram of an audio amplifier **[2]**

ii) Explain with the neat diagram. **[4]**

current series feedback

current shunt feedback

b) Explain astable multivibrator circuit using op-amp **[4]**

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

a) Write a note on ac load line.

b) Draw the circuit diagram of two stage RC coupled CE amplifier.

c) Write a note on crossover distortion.

d) Write a note on effect of negative feedback on distortion

e) Draw a block diagram of oscillator and state the barkhausen criterion.

f) Find out AC output power (P_{ac}), If DC input power (P_{dc}) = 1.6 watt. and efficiency of class A amplifier is η = 25%.

Total No. of Questions :5

SEAT No. : ____

PC-1272

[Total No. of Pages : 2

[6327]-73
S.Y. B.Sc.
ELECTRONIC SCIENCE
EL - 242 : Microcontroller and Python Programming
(CBCS)(2019 Pattern)(Paper - II)(Semester - IV)(24222)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any <u>THREE</u> questions from Q2 to Q5.***
3) ***Question No. 2 to 5 carry equal marks.***

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

a) What is microcontroller?

b) List any two types of Arduino board.

c) Write a syntax of digital write 'O' function in Arduino.

d) What is slicing in python?

e) List the identity operators in python.

f) Write any two application of python programming.

Q2) a) **Answer the following :**

i) Write the comparison operators in Arduino. **[2]**

ii) States the salient feature of Arduino Uno board. **[4]**

b) Write the rules for naming variable in python. **[4]**

Q3) a) **Answer the following :**

i) What are the benefits of python programming. **[2]**

ii) Explain switch case statement in Arduino with it's syntax. **[4]**

b) What is a loop? Write the python program to print first ten intergers using for loop. **[4]**

P.T.O.

Q4) a) **Answer the following :**

i) What are the different softwares used for python programming. **[2]**

ii) Explain bitwise operators in Ardunio. **[4]**

b) Write a python program to obtain factorial of given number using function. **[4]**

Q5) **Solve any four of the following:** **[10]**

a) What is function? Write advantages of function.

b) Explain identity operators of python.

c) Write a short note on string in python.

d) What are different types of operators supported by python?

e) Write a python code for division of two numbers.

f) Write any three features of microcontroller used in Arduino.

Total No. of Questions : 5]

SEAT No. : ____

PC-1273

[Total No. of Pages : 2

[6327] - 74
S.Y. B.Sc.
PSYCHOLOGY
Health Psychology

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

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 of the following :** **[5]**

a) Define health psychology.

b) Who gave the bio-psycho-social model?

c) What is chronic stress.

d) Define resilience.

e) State the full form of "REBT"

f) What is Illness.

Q2) a) Elaborate the various components of health. **[6]**

OR

Explain appraisal focused coping pattern

b) Analyze the effects of stress on Physical Health. **[4]**

P.T.O.

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

OR

Discuss the various health compromising behaviors

b) Prioritize the various barriers to health behaviour. **[4]**

Q4) a) How to cultivate inner strengths by hope & optimism. **[6]**

OR

Explain the sources and types of stress.

b) Analyse the holistic health and wellbeing. **[4]**

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

a) Mind body relationship model

b) Illness management

c) Happiness & Health

d) Catastrophic thinking

e) Human strengths

f) Life satisfaction

Total No. of Questions :5

SEAT No. : ____

PC-1274

[Total No. of Pages : 2

[6327]-75
S.Y. B.Sc.
PSYCHOLOGY
Psychological Testing and Applications
(Regular) (Credit System) (2019 Pattern) (Paper - II) (Semester - IV) (24202)

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

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any <u>THREE</u> questions from Q2 to Q5.***
3) ***Question 2 to 5 carries equal marks.***

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

a) Define Intelligence.

b) What is meaning of personality.

c) What is MMPI test.

d) Define mental health.

e) Name any one test for the assessment of mental health.

f) Define adjustment.

Q2) a) Discuss the characteristics of mentally healthy individual. **[6]**

OR

Describe the types of projective techniques.

b) Explain the importance of aptitude testing in vocational counseling. **[4]**

Q3) a) Discuss the types of intelligence test. **[6]**

OR

Describe the types or aspects of adjustment.

b) What is neuropsychological assessment. **[4]**

P.T.O.

Q4) a) Discuss nature and sub-types of Differential Aptitude test (DAT). **[6]**

OR

What are the applications of psychological test in business?

b) Discuss any one psychological test for adjustment assessment. **[4]**

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

a) Performance test of intelligence.

b) Importance of school and educational adjustment.

c) Test for assessment of abnormal behaviour or mental disorder.

d) Causes of poor mental health.

e) California psychological Inventory (CPI).

f) Importance of parent-children relationship.

Total No. of Questions : 5]

SEAT No. : ____

PC-1275

[Total No. of Pages : 2

[6327] - 76
S.Y.B.Sc.
Environmental Science
EVS-241: Biological Diversity and Its Conservation
(2019 Pattern) (Semester - IV) (Paper-I) (24241) (Credit System)

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 of the following : **[5]**

a) Define the term Endemism

b) What is meant by Genetic diversity

c) What is meant by Species Richness and Eveness

d) Full form of IUCN

e) Define the term Land races of Crops

f) Give any 2 Ecological significance of Bio-diversity

Q2) a) Write short note on various threats to Biodiversity **[6]**

b) Explain the concept of Joint Forest Management with a case study **[4]**

P.T.O.

Q3) a) Explain the concept of Endemism with an example **[6]**

b) Write short note on In-situ and Ex-situ conservation techniques **[4]**

Q4) a) Write short note on India as Mega Diversity Nation **[6]**

b) Explain Various people's movement in India for Biodiversity conservation **[4]**

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

i) Darwin's theory of Evolution and lamarck's theory of Natural Selection.

ii) Techniques of measuring genetic diversity

iii) National conservation efforts for Biodiversity

iv) Importance of Ecosystem in maintaining Ecological balance.

v) Methods of assessment of Biodiversity

vi) Major Ecosystems found in the world

Total No. of Questions : 5]

SEAT No. :

PC-1276

[Total No. of Pages : 2

[6327]-77

S.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 242 : Environmental Pollution Control Technology

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

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

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

a) Full form of **[1]**

i) $PM_{2.5}$

ii) PM_{10}

b) What is the use of screen chamber in waste water treatment plant? **[1]**

c) Define phytoremediation. **[1]**

d) Enlist any two Noise control techniques. **[1]**

e) How can chemical fertilizer use could be reduced? Give any 2 points. **[1]**

f) Who gives standard for Air Quality Monitoring Parameter. **[1]**

Q2) **Answer the following.**

a) Write in detail about primary treatment method for waste water treatment plant. **[6]**

b) What are the objectives of soil monitoring testing. **[4]**

Q3) **Answer the following.**

a) Write short note on how noise can be control at source. **[6]**

b) Explain different Physico-Chemical & Biological Parameter for water. **[4]**

P.T.O.

Q4) **Answer the following.**

a) Explain method for Analysis of SO*x* (sulphur dioxide). **[6]**

b) Write a note on Biogas generation from waste water treatment plant. **[4]**

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

a) Soil carbon flux. **[2½]**

b) Forest Inventory. **[2½]**

c) Water sample collection. **[2½]**

d) Measurement of Individual trees. **[2½]**

e) Guidelines for handling the water sample. **[2½]**

f) Chlorination. **[2½]**

▽▽▽▽

Total No. of Questions : 4]

SEAT No. :

PC-1277

[Total No. of Pages : 2

[6327]-78
S.Y.B.Sc.
Defence and Strategic Studies
DS 401: International Security
(2019 Pattern) (Semester - IV) (24231)

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

Instructions to the candidates:

1) ***A1l questions are compulsory***
2) ***Figures to the right indicate full marks.***

Q1) **Define the following questions :** **[5 × 1 = 5]**

a) Defme Nation.

b) What is International Law?

c) Define National Security.

d) What is Nationalism?

e) What is Common Security?

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

a) Regionalism

b) Non-Alignment

c) National Power

P.T.O.

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

a) State the Concept of Nation Power.

b) State the Importance of International Law.

c) Explain the Significance of Disarmament.

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

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

b) Describe the Impact on National Interest and Protection of Core values.

Total No. of Questions : 4]

SEAT No. :

PC-1278

[Total No. of Pages : 2

[6327]-79

S.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 402 : Defence Economics

(2019 Pattern) (Credit System) (Semester - IV) (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) Define Defence Budget.

b) Define Budget.

c) Define the Central budget.

d) Write types of budget.

e) Define Security.

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

a) HAL

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 Planning of Defence Budget.

c) Explain the role of the Private Sector in Indian Defence.

P.T.O.

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.

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Total No. of Questions : 4]

SEAT No. : [ ]

PC-1279

[Total No. of Pages : 2

[6327]-80

S.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 403 : Defence Journalism

(2019 Pattern) (Semester - IV) (24233) (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 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) Laws of Media

c) Defence & Media

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

a) Explain the Essential knowledge for a Defence Journalist.

b) Explain the Problems of Defence Journalists.

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

P.T.O.

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.

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Total No. of Questions : 3]

SEAT No. : ____

PC-1280

[Total No. of Pages : 1

[6327]-81

S.Y. B.Sc./Computer Science/ Biotechnology/BCA

LA-241: ABILITY ENHANCEMENT COMPULSORY COURSE (AECC IV)

English

(2019 Pattern) (CBCS) (Semester - IV) (Regular) (24321)

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

Instructions to the candidates:

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

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

a) Describe the humour and pathos from the story 'My Lost Dollar'.

b) Summarise the main ideas expressed in the poem 'Stopping by Woods on a Snowy Evening' and relate it to our life.

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

a) As you are a student respresentative of your college, draft a notice informing students about the Anual Cultural and sports activities to be organized in your college.

b) Write a note on 'Agenda'.

c) Explain the importance of content writing in blogs and video streaming sites.

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

a) What are the different soft skills to enhance our personality?

b) What is SWOT/C analysis?

c) What is project Management?

Total No. of Questions : 3]

SEAT No. :

PC-1281

[Total No. of Page : 1

[6327]-82
S.Y.B.Sc.
AECC - IV B : MARATHI (मराठी साहित्य)
पाठ्यपुस्तक : मराठी कथा दर्शन
(2019 Pattern) (Semester - IV) (CBCS) (Regular) (24331)

समय : 2 तास] *[पूर्णांक : 35*

सूचनाएँ : 1) सर्व प्रश्न सोडविणे आवश्यक आहेत.

2) उजवीकडील अंक प्रश्नांचे पूर्ण गुण दर्शवितात.

प्रश्न 1) खालीलपैकी कोणत्याही एका विषयावर उत्तर 300 शब्दांत लिहा. **[10]**

अ) वाढते औद्योगिकीकरण व प्रदूषणाची समस्या.

ब) शेतकऱ्यांच्या शेतमालाचे राजकारण

क) विविध समाजमाध्यमे व आजचा युवक

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

अ) 'पुढलया एका' या विज्ञानकथेतून वैश्विक शांततेचा संदेश कसा दिला आहे ते लिहा.

ब) '15 ऑगस्ट 1947' या कथेतील हैद्राबाद मुक्तिसंग्रामाची कहाणी थोडक्यात लिहा.

क) 'एका यंत्रमानवाच्या मनाचा शोध' या कथेचा आशय थोडक्यात लिहा.

ड) 'मारवा' कथेतील आबा आणि रघुनाथ या पिता – पुत्रांचे संबंध थोडक्यात स्पष्ट करा.

इ) 'कांचनमृग' या कथेतील व्याधाचे स्वभाव विशेष लिहा.

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

अ) 'लिंपण' कथेतून दलितांच्या जीवनातील वेदना कशा प्रकट झाल्या आहेत ते सोदाहरण स्पष्ट करा?

ब) गणेश आवटे यांच्या 'नांगरट' या कथेतील देवराव या शेतमजूराची व्यया स्पष्ट करा.

♦ ♦ ♦

Total No. of Questions : 3]

SEAT No. :

PC-1282

[Total No. of Page : 1

[6327]-83
S.Y.B.Sc.
हिंदी (Regular)
AECC - IV C : हिंदी काव्य तथा कहानी साहित्य
(2019 Pattern) (Semester - IV) (CBCS) (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 किन्हीं दो प्रश्नों के उत्तर लिखिए । **[15]**

अ) 'गील फरोश' कविता का आशय स्पष्ट कीजिए ।

ब) 'भूख' कविता का भावार्थ लिखिए ।

क) 'झाँसी की रानी' कविता में कवयित्री ने झाँसी की रानी का चित्रण किस प्रकार किया है ।

ड) 'रोटी और संसद' कविता का व्यंग्य स्पष्ट कीजिए ।

इ) 'मधुशाला' कविता की मूल संवेदना स्पष्ट कीजिए ।

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

अ) 'ईश्वर का द्वंद्व' कहानी की संवेदना स्पष्ट कीजिए ।

ब) 'बेटा' कहानी की कथावस्तु संक्षेप में लिखिए ।

क) 'शर्त' कहानी का उद्देश्य स्पष्ट कीजिए ।

ड) 'पत्नी' कहानी की सुनंदा का चरित्र – चित्रण कीजिए ।

इ) 'स्वेटर' कहानी के अमोल की चारित्रिक विशेषताओं को स्पष्ट कीजिए ।

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

अ) 'रोटी और संसद' कविता का आशय स्पष्ट कीजिए ।

ब) 'बेटा' कहानी के शीर्षक की सार्थकता स्पष्ट कीजिए ।

♦ ♦ ♦

Total No. of Questions : 4] **SEAT No. :**

PC-1283 **[Total No. of Pages : 2**

[6327]-84
S.Y. B.Sc.
SANSKRIT (Regular)
AECC - II E : Gīrvaṇabhārati
गीर्वाणभारती (निवडक वेचे)
(2019 Pattern) (Credit System) (Semester - IV) (24351)

Time : 2 Hours] ***[Max. Marks : 40***

Instructions : *1) **All questions are compulsory.***
सूचना : सर्व प्रश्न सोडविणे अनिवार्य आहेत.
*2) **Figures to the right indicate full marks.***
उजवीकडील अंक प्रश्नाचे पूर्ण गुण दर्शवितात.

Q1) **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.

Q2) Write notes (any two) : **[8]**

टीपा लिहा. (कोणत्याही दोन)

i) **विमानभेदाः**

ii) **रसायनशास्त्रम्**

iii) **सद्धर्मपुण्डरीकसूत्रम्**

Q3) Write short notes (any two) : **[8]**

टीपा लिहा. (कोणत्याही दोन)

i) **भास्कराचार्यः**

ii) **वैनायकम्**

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

Q4) Explain the summary of the lesson '**प्राचीन शास्त्रपरिचयः – (प्रथमो भागः)**'. **[8]**

'प्राचीन शास्त्रपरिचयः – (प्रथमो भागः)' 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. :

PC1284

[Total No. of Pages : 2

[6327]-86

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

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

CHNA-331 : Networking Fundamentals

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

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

Q1) Solve any five of the following. **[5×1=5]**

a) Define internet.

b) Which types of components use in computer network?

c) Write the benefits of computer network.

d) What is HTTP? Why it is used?

e) Define transmission media.

f) Write the different types of Protocols.

Q2) a) i) What is DNS service? **[2]**

ii) Explain Server - Client Networking **[4]**

b) Explain fiber cable? Write its advantages. **[4]**

Q3) a) i) Write the Benefits of Internet. **[2]**

ii) What are the advantages of digital transmission over analog transmission. **[4]**

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

P.T.O.

Q4) a) i) Write the advantages of peer to peer Network. **[2]**

ii) Explain Star topology in brief. **[4]**

b) Explain the uses of google drive and drop box. **[4]**

Q5) Attempt any four of the following. (short notes) **[4×2.5=10]**

a) FTP

b) Hub

c) File server

d) Electronic mail

e) Proxy services

f) Intranet

Total No. of Questions : 5]

SEAT No. : ____

PC-1285

[Total No. of Pages : 2

[6327]-87

S.Y. B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

CHNA-332 : Microprocessor & Interfacing - II

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

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 from 2 to 5 carry equal marks.***

Q1) **Solve any five of the following :** **[5 × 1 = 5]**

a) What are add-on cards?

b) What is scanner?

c) Write full-form of PAN.

d) What is mother board?

e) Expand MIDI.

f) Name the two Popular storage devices that are commonly used now a days.

Q2) a) Attempt the following :

i) Write any two applications of RFID system. **[2]**

ii) Differentiate synchronous and asynchronous.Serial communication, **[4]**

b) Explain keyboard as an input device. **[4]**

Q3) a) Attempt the following :

i) What is android? State any two features of android. **[2]**

ii) What is BIOS? Explain functions of BIOS. **[4]**

b) Explain in brief various types of storage devices available. Describe their typical features. **[4]**

P.T.O.

Q4) a) Attempt the following :

i) What is Wi-Fi? State applications of Wi-Fi. **[2]**

ii) What is Multimedia PC? State minimum requirements for multimedia PC. **[4]**

b) Explain in detail concept of green PC. **[4]**

Q5) Write short note on any four of the following : **[4 × 2½ = 10]**

a) Display adapters.

b) Speech synthesis and recognition.

c) Windows 8 O.S.

d) Wired and Wireless communication.

e) MPEG

f) N-computing concept.

g) Remote desktop sharing tools.

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Total No. of Questions : 5]

SEAT No. :

PC1286

[Total No. of Pages : 2

[6327]-88
S.Y.B.Sc. (Vocational)
BIOTECHNOLOGY
VBT 221 : Genetic Engineering
(2019 Pattern) (Semester-IV) (Regular) (Paper-III) (24571)

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

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

a) Define Vector.

b) Name the selectable markers of YAC vector.

c) Enlist any one application of PCR.

d) Define cloning vector.

e) Name the chemical method of DNA sequencing.

f) On What basis do proteins get separated in NATIVE-PAGE?

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

i) Explain the concept of insertional inactivation with the help of suitable example.

ii) Describe the mechanism of action of cry-protein.

iii) Explian the enzyme cascade reaction in pyrosequencing method.

b) Describe the particle gun method in detail. **[4]**

OR

Write a short note on type II restriction endonucleases.

P.T.O.

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

i) Explain BAC vector in detail.

ii) Describe the basic steps involved in gene cloning.

iii) Explain Sanger's method of DNA sequencing in detail.

b) Explain the procedure of Northern blotting. **[4]**

OR

Write a short note on "Nomenclature of restriction enzymes"

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

i) Give two examples of restriction endonucleases with its unique specific recognition site.

ii) Explain any three features of plasmid vectors.

iii) Describe the steps involved in sysnthesis of recombinant vaccines with the help of well labelled diagram.

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

OR

Describe the basic steps involved in PCR.

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

a) Role of primers in PCR.

b) Features of an ideal vector.

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

d) Applications of western blotting.

e) Antisense RNA technology.

f) Blunt ended DNA fragments and sticky end DNA fragments.

Total No. of Questions :5

SEAT No. :

PC-1287

[Total No. of Pages : 2

[6327]-89
S.Y. B.Sc.
VOCATIONAL BIOTECHNOLOGY
VBT - 222 : Bioinformatics (Paper - IV)
(CBCS) (2019 Pattern) (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) ***Question 2 to 5 carry equal marks.***

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

a) Define Paralogues.

b) What is CATH.

c) What are primary database?

d) Give full form of FASTA.

e) Name any one nucleic acid database.

f) What is PAM?

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

i) Distinguish between primary and secondary database.

ii) What is Prosite? Give its application.

iii) Comment on Application and Scope of Bioinformatics.

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

i) What are servers? Add a note on servers by NAR database.

ii) What are specialized database? Give their significance.

P.T.O.

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

i) What is BLOSUM series? Give its applications.

ii) What is sequence identity?

iii) Explain the concept of gene bank?

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

i) What are scoring matrices? Give its significance.

ii) Comment on Bibliographic database along with applications.

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

i) What is gene bank? Give its significance.

ii) Give principle of different methods for sequence analysis.

iii) What is PFAM? Give its applications.

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

i) Discuss in detail history of Bioinformatics.

ii) What is viral genome database? Give its significance.

Q5) **Write short note on any four :** **[10]**

a) Protein sequences

b) SCOP

c) PIR - PHD

d) Z - Sore

e) Pubmed

Total No. of Questions : 5]

SEAT No. :

PC1288

[Total No. of Pages : 2

[6327]-90

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

SEED TECHNOLOGY

ST 2.4 : Vegetable Seed Production

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

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

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

a) Define isolation distance.

b) Enlist the types of selection.

c) Give the botanical name of Bitter guard.

d) Enlist the pest and diseases in Brinjal.

e) Define kitchen type

f) What is plant Breeding?

Q2) a) Describe the procedure for pedigree selection in vegetable crops. **[6]**

b) Explain the progeny selection. **[4]**

Q3) a) Write the procedure of hybrid seed production in Okra. **[6]**

b) Explain the advantages and disadvantages of hybridization. **[4]**

P.T.O.

Q4) a) Write the seed extraction method, Harvesting and seed drying in Tomato. **[6]**

b) Write down the procedure for flat seed bed. **[4]**

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

a) Vegetable farming for seed production.

b) Objectives of population improvement.

c) Truck garden.

d) Explain pure line selection.

e) Objectives of vegetable seed production.

f) Cultural practices in Onion.

Total No. of Questions : 5]

SEAT No. : ____

PC-1289

[Total No. of Pages : 2

[6327] - 91
S.Y. B.Sc. (VOCATIONAL)
SEED TECHNOLOGY
ST 2.5: Seed Quality Control

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

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 of the following :** **[5]**

a) Define seed quality.

b) Write any two duties of seed inspector.

c) Define trap crop.

d) Define sanctioning legislation.

e) Give any two objectives of seed certification.

f) Define field inspection.

Q2) a) Explain in detail the procedure for seed law enforcement. **[6]**

b) Explain vermi compost and Biological control **[4]**

P.T.O.

Q3) a) Explain in detail central seed committee. **[6]**

b) Give short phases of seed certification. **[4]**

Q4) a) Explain general seed certification standard. **[6]**

b) Method of field inspection. **[4]**

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

a) Concept of seed quality

b) Power of seed inspector

c) Seed certification agencies.

d) Foundation seed and certified seed.

e) Appellate authority.

f) Seed legislation in India.

Total No. of Questions : 5]

SEAT No. : ____

PC-1290

[Total No. of Pages : 4

[6327]-96
S.Y. B.A./B.Com./B.Sc.
AECC-III : ENVIRONMENTAL STUDIES
(2019 Pattern) (Semester - IV) (Regular) (24361)

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.***

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

a) Give two examples of primary air Pollutants.

b) Which year Environmental protection Act inacted?

c) Write any two sources of SO_x.

d) Give two examples of invasive species.

e) What are the reason of growing energy needs?

f) Define species biodiversity.

Q2) **Answer the following :**

a) What is noise pollution? Give its causes, effects & control measures. **[6]**

b) What is industrial solid waste? Discuss its types. **[4]**

Q3) **Answer the following :**

a) What is global warming? Give its causes & effects. **[6]**

b) Write a note on Nature Reserve Zones. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Define earthquake. Give its causes & precaution measures. **[6]**

b) Write a note on Narmada Bachao Andolan. **[4]**

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

a) Environmental Law's

b) Health effects of Radiation

c) Role Indian culture in Environmental conservation

d) Cyclones

e) Rehabilitation problem

f) Methods of public awarness

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Total No. of Questions : 5]

PC-1290

[6327]-96
S.Y. B.A./B.Com./B.Sc.
AECC-III : ENVIRONMENTAL STUDIES
(2019 Pattern) (Semester - IV) (Regular) (24361)
(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 आहेत.

प्रश्न 1) खालीलपैकी कोणत्याही पाच प्रश्नांची उत्तरे लिहा. **[5]**

अ) प्राथमिक वायु प्रदुषकांची दोन उदाहरणे लिहा.

ब) पर्यावरण संरक्षण कायदा कोणत्या वर्षी आमलात आला?

क) सल्फरडाय ऑक्साईडचे कोणतेही दोन स्त्रोत लिहा.

ड) अतिक्रमणकारक प्रजातीची दोन उदाहरणे लिहा.

इ) अतिउर्जा वापराची कारणे सांगा.

फ) प्रजातीय जैवविविधतेची व्याख्या लिहा.

प्रश्न 2) खालील प्रश्नाची उत्तरे लिहा.

अ) ध्वनी प्रदुषण म्हणजे काय? ध्वनी प्रदुषनाची कारणे, परिणाम आणि उपाय योजना सांगा. **[6]**

ब) औद्योगीक घण कचरा म्हणजे काय? त्याचे सविस्तर प्रकार लिहा. **[4]**

प्रश्न 3) खालील प्रश्नांची उत्तरे लिहा.

अ) जागतीक तापमान वाढ म्हणजे काय? तापमान वाढीची कारणे व उपाय थोडक्यात लिहा. **[6]**

ब) नैसर्गिक राखीव क्षेत्रातील विविध भागांवर थोडक्यात माहीती लिहा. **[4]**

प्रश्न 4) खालील प्रश्नांचे उत्तरे लिहा.

अ) भूकंप म्हणजे काय? भूकंपाची कारणे व खबरदारीच्या उपाय योजना थोडक्यात सांगा. **[6]**

ब) नर्मदा बचाव आंदोलनावर थोडक्यात टिप लिहा. **[4]**

प्रश्न 5) खालीलपैकी कोणत्याही चार प्रश्न सोडवा. **[10]**

अ) पर्यावरणीय कायदे

ब) किरणोस्तरी प्रदुषकांचे आरोग्यावरिल परिणाम

क) भारतीय संस्कृतीची पर्यावरण संवर्धनातील भुमिका

ड) चक्रीवादळ

इ) पुनर्वसन सदर्भातील समस्या

फ) जनजागृतीच्या पद्धती

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