[5822]-402

S.Y.B.Sc.

MATHEMATICS

MT-242 (A): Vector Calculus

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

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

Instructions to the candidates:

1)   All questions are compulsory.

2)   Figures to the right indicate full marks.

3)   Attempt any Five of the following.

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

a)   Evaluate $\lim_{t \to 0} [e^{-t} \cos t\,\overline{i} + e^{-t} \sin t\,\overline{j} + e^{-t}\,\overline{k}]$.

b)   Find the unit tangent vector $\overline{T}$ for the vector function $\overline{r}(t) = (t^2 + 1)\overline{i} + (3 - t)\overline{j} + t^3\overline{k}$.

c)   Evaluate $\int_C 4x^2 ds$, where C is the circle, $\overline{r}(t) = 2\cos t\,\overline{i} +, 2\sin t\,\overline{j}, 0 \le t \le \dfrac{\pi}{2}$.

d)   Find curl $\overline{F}$, if $\overline{F} = 6x\,\overline{i} + (2y - y^2)\overline{j} + (6z - x^3)\,\overline{k}$.

e)   Find the gradient vector field of the function $f(x, y, z) = xy + yz + xz$.

f)   State stoke's Theorem.

g)   If S is the colsed surface enclosing a volume V and $\overline{F} = x\overline{i} + 2y\,\overline{j} + 3z\,\overline{k}$, then evaluate $\iint_S \overline{F} \cdot \overline{n}\, ds$

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

i)   Let $\overline{u}(s) = a(s)\overline{i} + b(s)\,\overline{j} + c(s)\overline{k}$ be a vector function of 's' and that $s = f(t)$ is a differentiable scalar function of 't' then prove that

$$\frac{d}{dt}\overline{u}(s) = \frac{d}{dt} f(t) \frac{d}{ds}\overline{u}(f(t)).$$

ii) Define line integral of a vector Field, $\bar{F}$. Evaluate $\int_C \bar{F} \cdot d\bar{r}$ where

$\bar{F}(x, y, z) = 8x^2 yz\bar{i} + 5z\bar{j} - 4xy\bar{k}$ and C is the curve given by

$\bar{r}(t) = t\bar{i} + t^2\bar{j} + t^3\bar{k}, 0 \le t \le 1.$

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

i) Find the arclength along the curve $\bar{r}(t) = 6\sin 2t\bar{i} + 6\cos 2t\bar{j} + 5t\bar{k}$, From $t = 0$ to $t = \pi$ Also find the unit tangent vector of the curve.

ii) Discuss the continuity of the function

$$\bar{F}(t) = \begin{cases} \left(\dfrac{t^2-1}{\ln t}\right)\bar{i} + \left(\dfrac{\sqrt{t}-1}{l-t}\right)\bar{j} + \tan^{-1}(t)\bar{k} \ , if \ t \ne 1 \\ \\ 2\bar{i} - \dfrac{1}{2}\bar{j} + \dfrac{\pi}{4}\bar{k} \qquad\qquad , if \ t = 1 \end{cases}$$

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

i) If $f(x, y, z)$ is a differentiable Function and (is a continous Path joining points A (x_0, y_0, z_0) and B (x_1, y_1, z_1) then prove that

$\int_c \nabla f \cdot d\bar{r} = f(B) - f(A)$

ii) Give Parametrization of a sphere of radius 'a' Find the surface area of sphere $x^2 + y^2 + z^2 = a^2$.

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

i) Determine whether the vector field,

$\bar{F} = (2x^3 y^4 + x)\bar{i} + (2x^4 y^3 + 4)\bar{j}$ is conservative and find a potential Function for $\bar{F}$.

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

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

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

    ii) State Divergence Theorem and using it find the outward Flux of $\overline{F} = (y - x)\overline{i} + (z - y)\overline{j} + (y - x)\overline{k}$ across the solid sphere $x^2 + y^2 + z^2 \le 4$.

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

    i) Using Greens theorem, evaluate $\oint_C (6y + x)\ dx + (y + 2x)dy$ where C is the circle $(x - 2)^2 + (y - 3)^2 = 4$.

    ii) Using stoke's Theorem, evaluate $\iint_S \nabla \times \overline{F} \cdot \overline{n}\ d\sigma$, where $\overline{F} = z^2\ \overline{i} - 3xy\ \overline{j} + x^3 y^3 \overline{k}$ and S is the part of $z = 5 - x^2 - y^2$, above the plane $z = 1$. Assume that S is oriented upwards.

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[5822]-403
S.Y.B.Sc.
MATHEMATICS
MT-242(B) : Dynamical Systems
(2019 CBCS Pattern) (Semseter - IV) (Regular) (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) Reduce the second order differential equation into system of first order differential equations.

   $5x'' - 2x' + 6x = 0$.

 b) State Rational root theorem.

 c) Find the general solution of the differential equation $\dfrac{dx}{dt} = ax(t)$

 d) Give an example of a system of differential equation for which (e^t, e^{-3t}) is a solution .

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

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

 g) Write $x'' + 4x' = 0$ in the form of $x' = \mathrm{A}x$.

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

i) If the matrix $A = \begin{bmatrix} -2 & 2 & 3 \\ -2 & 3 & 2 \\ -4 & 2 & 5 \end{bmatrix}$ has eigen values 1, 2 and 3, then find

eigen vectors corresponding to these eigen values.

ii) Let matrix $A = \begin{bmatrix} 4 & 0 & 1 \\ -2 & 1 & 0 \\ -2 & 0 & 1 \end{bmatrix}$. Is matrix A diagonalizable? Also find

eigen values of matrix A^3.

b) 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 eigen value of A.

ii) Suppose that v_0 is an eigen vector for the matrix A with associated eigen value λ_1 then prove that the function $X(t) = e^{\lambda t} v_0$ is a solution of the system $X' = AX$.

Q3) 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) Prove that planer linear system $X' = AX$ has

1) A unique equilibrium point (0,0) if $\det(A) \neq 0$ and

2) A straight line of equilibrium point if $\det(A) = 0$

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

i) For the differential equation $x'(t) = x^4 - x^2$, find all equilibrium solutions and determine if they are sink, source or neither?

ii) Consider the system $X' = \begin{bmatrix} 1 & 3 \\ 1 & -1 \end{bmatrix} X$. Find the general solution of

the system and also find stable and unstable lines.

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

     i) Let A, B, T be n × n matrices, then prove that

        1) if B=T⁻¹AT, then exp(B)=T⁻¹exp(A)T

        2) if AB=BA, then exp(A+B)=exp(A).exp(B).

     ii) Let A, be an n × n matrix, then prove that the solution of the initial value problem $X' = AX$ with X(0)=X_0 is X(t) = exp(tA)X_0.

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

     i) Find the solution of the initial value problem

$$X' = \begin{bmatrix} -\dfrac{1}{10} & 1 \\ -1 & -\dfrac{1}{10} \end{bmatrix} X, \quad X(0) = (2,2).$$

     ii) Find the canonical form of the matrix

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

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[5822]-404

S.Y. B.Sc.

PHYSICS - I

PHY- 241 : Oscillations, Waves and Sound

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

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

Instructions to the candidates:

1) *Question 1 is compulsory.*
2) *Solve any three questions from Q.2 to Q.5.*
3) *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 angular simple harmonic motion.

b) Define quality factor of an oscillator.

c) What are seismic waves?

d) What is Red Shift?

e) The frequency of a damped oscillator of mass 3 gm is 10 Hz. If the coefficient of damping is 0.314 dyne/cm s^{-1}, determine its Q value.

f) Calculate the change in intensity level when the intensity of sound increases by 1000 times the original intensity?

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

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

OR

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

b) Obtain the expression of period and frequency for linear Simple Harmonic Motion.   **[4]**

Q3) a) Prove that the velocity of transverse waves over a string of linear density

(μ) is $C = \sqrt{\dfrac{T}{\mu}}$, where T is the tension. **[6]**

OR

Show that Doppler effect in light is symmetric.

b) The restoring force per unit displacement of magnitude 2 N/m acts on an oscillator of mass 2.5×10^{-2} kg. If the coefficient of damping is 0.5 N/ms^{-1}, find whether the motion is over damped, critically damped or damped oscillatory. **[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 zero and $\pi/2$ radians. **[6]**

OR

Set up the differential equation of forced oscillations. Hence obtain amplitude and phase in forced oscillations as given by

$A = \dfrac{f_o}{\sqrt{\left(k - mq^2\right)^2 + R^2 q^2}}$ and $\tan\phi = \dfrac{qR}{k - mq^2}$ where symbols have their

usual meanings.

b) A spectral line of wavelength 5890 AU in the spectrum of a star is found to be displaced by 1.178 AU from its normal position towards the red end of the spectrum. Determine the velocity of the star and mention sense of the motion. **[4]**

Q5) Write short notes on any four of the following: **[10]**
   a) Lissajous figures.
   b) Damped oscillations in LCR series circuit.
   c) Resonance.
   d) Primary or P waves.
   e) Transverse waves.
   f) Sound Intensity.

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[5822]-405

S.Y. B.Sc.

PHYSICS

PHY - 242 : Optics (Paper - II)

(24122) (CBCS - 2019 Pattern) (Semester - IV)

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

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

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

a) Define optical centre of a lens.

b) Calculate the focal length of double convex lens for which radii of curvature for both surfaces are 25cm and refractive index of material is 1.5.

c) A converging lens of power 25 D is used as a simple microscope. Calculate the magnifying power, if the distance of distinct vision is 25cm.

d) What is diffraction of light?

e) What is meant by resolving power of an optical instrument?

f) Give reason why sound waves cannot polarize?

Q2) a) Prove that for a combination of two thin lenses of focal lengths f_1 and f_2 separated by distance X, the focal length of the combination is given by

$$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} - \frac{X}{f_1 f_2}$$ **[6]**

OR

Obtain the expression for resolving power of a diffraction grating.

b) Draw ray diagram of simple microscope. Derive an expression for magnifying power of the simple microscope. **[4]**

Q3) a) Describe in brief the phenomenon of double refraction of Birefringence.
[6]

OR

Give the theory of plane transmission grating. Discuss the conditions under which principal maxima will occur.

b) The focal length of a lens in air is 15cm. What will be its focal length if air is replaced by water. (R. I. of glass = 1.45, R. I. of water = 1.33) **[4]**

Q4) a) With neat ray diagram explain construction and working of Ramsden's eyepiece.
[6]

OR

Derive the lens maker's formula for a thin lens.

b) Monochromatic light of wavelength 6000 Å is incident normally on a diffraction grating. The first order maxima is observed in the direction of 15. Calculate the grating element.
[4]

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

a) Astronomical telescope.

b) Cardinal points

c) Applications of Newton's rings

d) Brewster's law.

e) Fresnel's diffraction.

f) Types of monochromatic aberration.

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[5822] - 406

S.Y. B.Sc.

CH 401 : PHYSICAL AND ANALYTICAL CHEMISTRY

(CBCS 2019 Pattern) (Semester - IV) (24131) (REGULAR)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

1) *Question No.1 is compulsory.*
2) *Solve any three Questions from Q.No. 02 to Q.No. 05.*
3) *Question No. 02 to 05 carry equal marks.*
4) *Use of calculators & log table are allowed.*
5) *Figures to the right indicates full marks.*

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

a) What is mean by system?

b) Define Real solutions.

c) The transmittance of solution of a substance was found to be 90% calculate absorbance.

d) If the length of conductivity cell is 1.72cm and area of cross section of the cell is 4.5 cm^2, calculate cell constant of the cell.

e) What is mobile phase?

f) Define conjugate solutions.

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

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

ii) What is Azeotropic mixtures? Give its examples.

iii) What do you mean by conductance and specific conductance. Give its units.

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

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

  i) Explain the separation of chloride and bromide ions by ion exchange chromotography.

  ii) Discuss the phase diagram of CO_2.

  iii) Explain phenol-water system of critical solution temperature.

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

  i) The resistance of the 0.02 N KCl solution at 25°C is 400 ohm. Calculate the conductance of the solution.

  ii) Calculate the motar absorptivity of 1.8×10^{-5}M solution having 0.35 absorbance when placed in the cell of 1.5 cm path length.

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

  i) Deduce the expression of phase rule.

  ii) Explain the principle of size exclusion chromatography with one application.

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

 b) A cell constant of conductivity cell is 0.86 cm^{-1}. It is filled with 0.06M solution of NaCl whose resistence found to be 365 ohm. Calculate the equivalent conductance of NaCl solution. **[4]**

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

 a) Partial molar free energy

 b) The fractionating column

 c) Photomultiplier tubes

 d) Anion exchange resins

 e) Purification of anthracene by column chiomatograpy

 f) Conductometric titration of strong acid & weak base.

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[5822]-407

S.Y. B.Sc.

CHEMISTRY

CH-402: Inorganic and organic Chemistry

(2019 CBCS Pattern) (Semester-IV) (24132) (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)   *Atomic number of Ni = 28.*

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

   a)   Define Isomerism.

   b)   Define inner orbital complex.

   c)   Find the number of unpaired electrons in d^5 weak field octahedral complex.

   d)   What is silver mirror test?

   e)   How carboxylic acid prepared using dry ice?

   f)   Explain amines are basic in nature.

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

     i)   Draw cis and trans isomers in $[Co(NH_3)_4 Cl_2]^+$

     ii)   Calculate the CFSE for d^5 ion in high and low spin octahedral field.

     iii)   Draw Geometrical isomers of $[C_r(en_2) Cl_2]^+$

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

     i)   Baeyer's strain theory

     ii)   Locking of conformation

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

     i)   Explain how n-propylamine can be prepared from cycloethane.

     ii)   Explain Aldol condensation with suitabl example.

     iii)   Explain any two methods of Preparation of aldehyde.

   b)   Discuss the factors affecting the magnitude of 10D9 cr$\Delta_\circ$ **[4]**

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

      i)   Give assumptions of VBT.

      ii)   Discuss Reformatsky reaction.

      iii) Write note on Hell Volhard - Zelinsky reaction.

  b) State and explain the Jahn - Teller distortion with suitable example. **[4]**

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

  a) Explain the term high spin and low spin complexes.

  b) Give assumptions of CFT

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

  d) Give classificaiton of carboxylic acid.

  e) Identify the products 'A' and 'B' and rewrite the reaction.
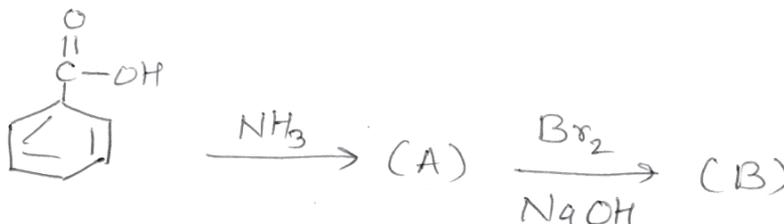
  f) Explain the bonding, structure and magnetic properties of $[Ni(CN)_4]^{2-}$.

[5822]-408

S.Y. B.Sc.

BOTANY - I

BO - 241 : Plant Anatomy and Embryology

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

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

Instructions to the candidates:

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

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

   a) Define Mechanical tissue system.

   b) Give any two applications of Anatomy in Taxonomy.

   c) Define Embryology.

   d) Enlist the parts of ovule.

   e) What is unitegmic ovule?

   f) Define Anatomy.

Q2) a) Describe the structure of typical Dicot and Monocot Stomata.   **[6]**

   b) Explain Monosporic embryo sac.   **[4]**

Q3) a) Explain the process of anomalous secondary growth in <u>Bignonia</u> stem.**[6]**

   b) Explain in brief different types of pollination.   **[4]**

Q4) a) Describe the structure of tetrasporangiate anther.   **[6]**

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

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

  a)   Inflexibility

  b)   Dicot embryo

  c)   Nuclear endosperm

  d)   Tyloses

  e)   Structure and functions of xylem

  f)   Orthotropous ovule.

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[5822]-409

S.Y. B.Sc.

BOTANY - II

BO - 242 : Plant Biotechnology

(CBCS 2019 Pattern) (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) *Questions 2 to 5 carry equal marks.*
4) *Figures to right indicate full marks.*
5) *Draw neat labelled diagrams wherever necessary.*

Q1) Attempt any <u>five</u> of the following.   **[5]**

    a)   What is Phytoremediation?

    b)   Enlist two renewable energy sources.

    c)   Write any two scopes of Biotechnology.

    d)   Define sterilization.

    e)   What is plant tissue culture?

    f)   Enlist any two transgenic plants.

Q2) a)   Describe somaclonal variation and haploid production.   **[6]**

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

Q3) a)   Explain application of Genetic engineering with respect to abiotic stress tolerance.   **[6]**

    b)   Write steps involved in inoculation.   **[4]**

Q4) a)   Describe the concept of proteomics.   **[6]**

    b)   Write acceptability of SCP.   **[4]**

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

a) Status of biotechnology in India.

b) Microbial remediation.

c) Process of hardening in plant tissue culture.

d) Importance of SCP

e) Plasmid vectors

f) Bioinformatics

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[5822]-410

S.Y. B.Sc.
ZOOLOGY
ZO - 241 - Animal Diversity-IV
(CBCS 2019 Pattern) (Semester - IV) (Paper - I) (Regular) (24151)

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

Instructions to the candidates:
　　1)　Question 1 is compulsory.
　　2)　Solve and 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 two examples of class Mammalia.

　　b)　Give any one salient feature of class Reptilia.

　　c)　Give any one example of wood chiselling beak.

　　d)　Give the function of internal ear of Rat.

　　e)　Write name of any two digestive glands of Rat.

　　f)　Write any one habit of Rat.

Q2) a)　Describe in brief about aquatic adaptations in mammals.　**[6]**

　　　　　　　　　　　　　OR

　　　　Describe in brief desert adaptation in reptiles.

　　b)　Describe in brief respiratory system of Rat.　　　　　　**[4]**

Q3) a)　Describe the male reproductive system of Rat.　　　　　**[6]**

　　　　　　　　　　　　　OR

　　　　Describe the alimentary canal of Rat.

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

Q4) a) Sketch & label V.S. of eye of Rat. **[6]**

<div align="center">OR</div>

b) Sketch & label internal structure of heart of Rat.

b) Describe different types of migration in birds. **[4]**

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

a) Viper snake

b) Cursorial adaptations in Mammals.

c) Systematic position of Rat.

d) Structure of internal ear of Rat.

e) Fruit eating beak.

f) Sexual dimorphism in Rat.

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[5822]-411

S.Y. B.Sc.

ZOOLOGY

ZO - 242 : Applied Zoology - II

(CBCS 2019 Pattern) (Semester - IV) (Paper - II) (24152) (Regular)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

1) *Question 1 is compulsory.*
2) *Solve any three questions from Q2. to Q5.*
3) *Question 2 to 5 carry equal marks.*

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

   a) What is Apiary?

   b) Give biological name of Rohu.

   c) What is fish fin soup?

   d) Give role of Queen excluder.

   e) What is absconding?

   f) What is royal jelly?

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

OR

What is fisheries? Describe types of fisheries.

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

Q3) a) Describe Dol net and Cast net. **[6]**

OR

Give duties of worker bees.

   b) Describe bee veil and honey extractor. **[4]**

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

OR

Give uses of fish liver oil and fish meal.

b) Give Habit and habitat of catla. **[4]**

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

a) Machawa Craft

b) Freezing

c) Damage caused by greater wax moth

d) Smoker

e) Wag tail dance

f) Harvesting methods of Mackerel

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[5822]-412

S.Y. B.Sc.
GEOLOGY
GL - 221 : Global Tectonics and Geodynamics of the Lithosphere
(2021 Credit Pattern) (Regular) (Semester - IV) (Paper - I) (24161)

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

Instructions to the candidates:

1) *Question no. 1 is compulsory.*

2) *Solve any three questions from Q.2 to Q.5.*

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

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

a) Define - Lithosphere.

b) Define - Platform.

c) Define - Deep Sea Treches.

d) Give any two characteristics of Asthenosphere.

e) Define - Abyssal hills.

f) Name any four minor plates.

Q2) Answer the following:

a) Explain the physical properties & characteristics of three Spherical Zones of the Earth namely Crust, Mantle & Core. **[6]**

b) Explain the Airy Hypothesis. **[4]**

Q3) Answer the following:

    a)   Explain the various Indian Cratons. **[6]**

    b)   Explain the various Indirect Sources of information about the Earth's interior. **[4]**

Q4) Answer the following:

    a)   Define Geotherms. Explain the heat sources within Earth & give its applications. **[6]**

    b)   Explain Seafloor spreading & give its application. **[4]**

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

    a)   Crust of the Earth.

    b)   Mesosphere.

    c)   Seismic discontinuities.

    d)   Aravalli craton.

    e)   The Singhbhum Mobile belt.

    f)   Island arcs.

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[5822]-413

S.Y. B.Sc.

GEOLOGY

GL- 222 : Environmetal Geology and Geogenic Disasters

(2019 Pattern) (Credit System) (Semester - IV) (24162) (Regular)

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 Question 5 carry equal marks.*

Q1) Answer in 2 - 3 sentences (Any 5): **[5]**

 a) Define point source pollutants.

 b) State the non-renewable resources.

 c) What causes 'Blue baby syndrome'?

 d) State the underground sources of water.

 e) What causes permanent hardness of water?

 f) What are biodegradable pollutants?

Q2) Answer the following:

 a) Describe causes of Volcanoes. **[6]**

 b) Explain magnitude of an Earthquake. **[4]**

Q3) Answer the following:

    a)   Explain the Anthropogenic sources of Heavy metal pollutants.   **[6]**

    b)   Explain types of Droughts.   **[4]**

Q4) Answer the following:

    a)   Explain excess flow as a cause of Floods.   **[6]**

    b)   Explain 'slide' type of Landslide.   **[4]**

Q5) Answer any 4 of the following: **[10]**

    a)   Toxic effects of Lead on human body.

    b)   Alkanity of water.

    c)   Describe 'Carbon Cycle'.

    d)   Industrial waste as a cause of water pollution.

    e)   What is 'Eutrophication'?

✈   ✈   ✈

[5822]-414

S.Y. B.Sc.

STATISTICS

ST - 241 : Tests of Significance and Statistical Methods

(2019 Pattern) (Semester - IV) (Credit System) (24171) (Regular)

(Paper - I)

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

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Figures to the right indicate full marks.

    3)   Use of calculator and statistical table is allowed.

Q1) Attempt each of the following:

    A)   In each of the following case choose the correct alternative: **[1 each]**

        a)   Type I error is _____.

            i)   accepting H_0 where is false   ii)   rejecting H_0 when it is false

            iii)   accepting H_0 when it is true   iv)   rejecting H_0 when it is true

        b)   The range in which multiple correlation coefficient lies is _____.

            i)   –1 to 1   ii)   0 to 1

            iii) $-\infty$ to ∞ iv)   0 to ∞

        c)   Expected waiting time of customers in the queue in case of M/M/1 model is _____.

            i) $1-\dfrac{\lambda}{\mu}$ ii) $\dfrac{1}{\mu-\lambda}$

            iii) $\dfrac{\lambda}{\mu-\lambda}$ iv) $\dfrac{\lambda}{\mu(\mu-\lambda)}$

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

a) The rates of vital events are measured in per million.

b) Critical region is a region of rejection null hypothesis.

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

a) Explain the terms :

i) P - value

ii) Confidence interval

iii) Statistics

b) Show that $R^2_{1.23} = b_{12.3} r_{12} \dfrac{\sigma_2}{\sigma_1} + b_{13.2} r_{13} \dfrac{\sigma_3}{\sigma_1} + b_{13.2} r_{13} \dfrac{\sigma_3}{\sigma_1}$.

c) Explain the methods of collecting vital statistics.

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

a) A sample of 800 ball bearings is found to have average weight of 12.5 grams. Can we assume that a sample is coming from a population with mean 13 grams against that it is less than 13 grams? (Assume that the population standard deviation is 1 gram).

b) Show that a multiple correlation coefficient cannot be negative.

c) One customer arrives at a counter in a bank after every 15 minutes. Staff on the counter take 10 minutes on an average for serving a customer. Under the assumptions for applying M/M/1 : ∞ /FCFS model, Find:

i) Average queue length.

ii) A second counter will be started if waiting time of customer in the queue is at least 15 minutes. Can you justify a need of second counter?

Q4) Attempt any one of the following.

    a)   i)   Derive the equation of regression plane of Y on X_1 and X_2.   **[7]**

        ii)   Define: **[3]**

             1)   Crude Death Rate (CDR)

             2)   Crude Birth Rate (CBR)

             3)   Standardized Death Rate (S.T.D.R.)

    b)   i)   A manufacture of ball - bearing guarantees that 2% of items are defective. A sample of 1000 ball bearings gave 25 defective, can we say the product meets guarantee?   **[5]**

        ii)   Calculate G.R.R. and N.R.R. for the following data and interpret.**[5]**

Age - Group	15-19	20-24	25-29	30-34	35-39	40-44
No. of woman	16,000	15,000	16,500	14,000	16,000	12,000
Femal births	160	225	330	210	144	90
Mortality rate	0.09	0.10	0.11	0.12	0.13	0.14

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[5822]-415
S.Y.B.Sc.
STATISTICS
ST-242: Sampling Distribution and Exact Tests
(24172) (2019 CBCS Pattern)(Semester-IV) (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.*

   3)   *Use of statistical tables and calculator is allowed.*

Q1) Attempt each of the following:

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

       i)   Let $X \to G(1,3)$ then variance of X is

          A)   3   B) $\dfrac{1}{3}$

          C)   1   D)   9

       ii)   Let $X \to \chi_6^2$ then which of the following is true?

          A) $\mu_2' = 6$ B) $\mu_2' = 12$

          C) $\mu_2' = 36$ D) $\mu_2' = 48$

       iii)   Let $X \to t_7$ then distribution of $Y = \dfrac{1}{X^2}$ is

          A) $F_{1,1}$ B) $F_{1,7}$

          C) $F_{7,7}$ D) $F_{7,1}$

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

       i)   Let $X \to N(\mu,\sigma^2)$ μ known, the test statistic for testing $H_0 : \sigma^2 = \sigma_0^2$ Vs $H_1 : \sigma^2 \neq \sigma_0^2$ follows chi-square distribution.

       ii)   Let $X \to t_{10}$ then the mode of X is 10.

                                                      P.T.O.

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

    a)   Obtain moment generating function of chi square distribution with n degrees of freedom.

    b)   Derive an expression for r^{th} raw moment of F- distribution with n_1 and n_2 degrees of freedom. Hence find mean of the distribution.

    c)   Describe the test procedure for testing $H_0 : \sigma^2 = \sigma_0^2$ against $H_1 : \sigma^2 \neq \sigma_0^2$.

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

    a)   State and prove additive property of Gamma distribution.

    b)   Let X and Y are independent chi square random variables with m and n degrees of freedom respectively, show that $U = X + Y$ and $V = \dfrac{X}{X + Y}$ are independently distributed.

    c)   Find $(2r)^{th}$ central moment (μ_{2r}) of t distribution with n degrees of freedom.

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

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

       ii) Explain paired t-test along with the assumptions made. Give one illustration in which this test can be used. **[5]**

    b) i)   A random sample of 10 boys has mean weight of 63.2 kg with standard deviation of 7 kg. Test whether mean population weight of boys is 60 kg.[Use $\alpha = 0.05$] **[5]**

       ii) Show that median of $F_{n,n}$ is unity. **[3]**

      iii) Let t_{12} follows Student's t-distribution with 12 degrees of freedom find 'c' such that $P(-c < t_{12} < c) = 0.8$. **[2]**

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S.Y. B.Sc.
GEOGRAPHY
Gg-241: Environmental Geography-II
(2019 CBCS Pattern) (Semester-IV) (Paper-I) (Regular) (24181)

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

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

a)   What is mean by Environment Impact Assessment?

b)   Write any two important acts and regulations for environmental protection.

c)   What is mean by wildlife?

d)   What is sustainable development?

e)   What do you mean by solid waste management?

f)   Define term 'conservation'.

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

i)   Write any three provision made in forest conservation act - 1980.

ii)   Describe steps in environment Impact Assessment.

iii)   Describe the term environment policy.

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

i)   Write any two amendments of wildlife protection act - 1972.

ii)   Write objectives of Environmental protection act - 1986.

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

    i) Explain need and importance of water conservation

    ii) Explain Delphi method of Environment Impact Assessment.

    iii) State the reasons for holding the world summit.

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

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

    ii) Explain the need and importance of energy conservation.

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

    i) Describe the scope of Environment Impact Assessment.

    ii) Describe the importance of Tiger conservation programme in India.

    iii) Explain the importance of Stockholm conference-1972.

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

    i) What is afforestation? write the causes of afforestation.

    ii) Explain the various principles of environmental planning and management.

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

    a) Sustainable Development summit - 2015.

    b) Approaches of environmental planning and management.

    c) Water conservation with respect to Ganga action plan.

    d) Kyoto Protocol - 1997.

    e) 33 crore tree plantation programme in Maharashtra.

    f) Solid waste management.

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[5822]-417

S.Y. B.Sc.

GEOGRAPHY-II

Gg-242: Geography of Maharashtra (Human) - II

(2019 CBCS Pattern) (Semester-IV) (Paper-II) (24182) (Regular)

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

Instructions to the candidates:

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

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

a) Name any two minor religions in Maharashtra.

b) Write the names of two food crops of maharashtra.

c) Give any two causes of migration.

d) Which is the fastest mode of transportation?

e) Name any two major social media platforms.

f) Write the full form of MIDC.

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

i) Write the geographical requirement for the jowar crop

ii) Give the causes of interstate migration

iii) Explain the role of sugar industry in agricultural development of maharashtra.

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

i) Describe the prospects of wine industry in maharashtra.

ii) Explain the importance of metro in maharashtra.

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

i) Explain the effects of rural to rural migration in maharashtra.

ii) Describe the prospects of cotton industry in maharashtra.

iii) What is the importance of newspapers in communication?

P.T.O.

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

    i) Give the distribution of rice crop in maharashtra.

    ii) Explain the significance of social media in communication.

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

    i) Write the importance of road transportation in maharashtra.

    ii) Explain the future of grape farming in maharashtra.

    iii) Give the characteristics of urban to urban migration in maharashtra.

b) Answer the following question in 150 words (Any1) **[4]**

    i) Describe in brief the population distribution in maharashtra.

    ii) Explain the importance of MIDC in Industrial development of maharashtra.

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

    a) Spatial distribution of religions in maharashtra.

    b) Distribution of onion crop in maharashtra.

    c) IT industries of maharashtra.

    d) Major transportation projects in maharashtra.

    e) Papulation growth in maharashtra.

    f) Major problems of agriculture of maharashtra.

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[5822]-418

S.Y. B.Sc.

MICROBIOLOGY

MB - 241 : Bacterial Genetics

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

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

Instructions to the candidates:

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

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

a)   Define Nonsense mutation.

b)   Draw the structure of Thyamine.

c)   A form of DNA has _____ base pairs per turn of helix.

d)   Codons are present on mRNA (T/F).

e)   What is amber mutation?

f)   _____ is the biological process of producing two identical replicas of DNA from one original DNA.

Q2) a)   Answer the following (Any three):   **[6]**

i)   Draw structure of nucleotide.

ii)   What is the function of DNA helicase?

iii) Describe mechanism of spontaneous mutation.

iv)   What is plasmid curing?

b)   Diagrammatically represent semiconservative mode of DNA replication.**[4]**

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

   i) Termination of DNA replication.

   ii) Missense mutation.

   iii) Transcription process.

   iv) Properties of plasmid.

b) Describe Avery, MacLeod, McCarty experiment. **[4]**

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

   i) Role of Ori C site in DNA replication.

   ii) 5 bromouracil.

   iii) Plasmid incompatibility.

   iv) Reverse and suppressor mutation.

b) Describe Griffith's experiment. **[4]**

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

a) Gierer and Schramm experiment.

b) Bonds involved in DNA structure.

c) Six basic rules of DNA replication.

d) Initiation of Translation.

e) Replica plate technique.

f) HNO_2 as a mutagenic agent.

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[5822]-419

S.Y. B.Sc.
MICROBIOLOGY
MB - 242 : Air, Water and Soil Microbiology
(2019 Pattern) (CBCS) (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 is aerosol?

   b)   Impingement method uses a _____ medium for the collection of airborne organisms.

        i)   Liquid   ii)   Solid

        iii)   Semisolid   iv)   Gaseous

   c)   _____ promotes the growth of lowland paddy by supplying Nitrogen.

   d)   Enlist any two fungal biocontrol agents.

   e)   What is Rhizosphere?

   f)   _____ is the water, that has first beem turned into steam, so that all of its impurities are left behind.

Q2) a)   Answer the following (Any three):   **[6]**

        i)   Draw neat labeled diagram of 'Rapid Sand filter'.

        ii)   Name any four water borne protozoal infections with their causative agents.

iii) Write note on - Mycorrhizal biofertilizers.

iv) Explain centrifugation and sedimentation method of air sampling.

b) Explain large scale production of Azotobacter biofertilizer with respect to:**[4]**

i) Medium used

ii) parameters of fermentation

iii) ISI specifications

Q3) a) Answer the following (any three): **[6]**

i) Write note on clostridium perfringens as indicator of water pollution.

ii) Explain biochemical steps involved in Nitrogen cycle.

iii) Describe any one method of physical air sanitation.

iv) Explain role of bacterial population in composting of organic matter.

b) Describe 'membrane filter technique'. **[4]**

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

i) With suitable examples explain following microbial interactions.

1) Symbiosis

2) Neutralism

ii) Write 'significance of Endo/EMB agar' for the confirmed test of potability of water.

iii) What are water quality standards of MPCB for A I & A II category of fresh water?

iv) Draw neat labeled diagram of carbon cycle.

b) Write production of viral biocontrol agent with respect to: **[4]**

    i)   Examples of Viruses as biocontrol agent.

    ii)   Host species of viral agents of each.

    iii) Advantages of use of viruses as biocontrol agents.

Q5) Answer the following (any Four): **[10]**

    a)   What is 'MPN' test. Write its significance.

    b)   Explain Rhizosphere microflora and its role.

    c)   Name any five air borne infections caused by bacteria with their causative agents.

    d)   Write note on 'Humus'.

    e)   Explain 'Ammensalism' with suitable example.

    f)   Describe any two methods using chemicals for air sanitation.

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[5822]-420

S.Y. B.Sc. (Nanoscience and Nanotechnology)
N.S. 241 - ORGANIC AND POLYMER SCIENCE OF NANOMATERIALS
(2019 Pattern) (Semester-IV) (Paper-I) (24261) (Regular) (Credit System)

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)　Draw neat and 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 nanotubes model.

　b)　Give any two properties of carbon nanotubes.

　c)　Give the formula of molecular weight of polymer.

　d)　What is 'emulsion polymerisation'?

　e)　Give the types of nano composites.

　f)　What is 'Graphene Oxide' (GO).

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

　　i)　Explain in detail cataionic polymerisation.

　　ii)　Give the classification of conducting polymerisation.

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

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

　　i)　Give the classification of conducting polymers.

　　ii)　Explain 'Growth mechanism of carbon nanotubes'.

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

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

     i) Explain 'Extrinsically conducting polymer'.

     ii) Explain properties of Graphene.

  b) What is 'Nano Fillers'? Explain classification of Nano Fillers. **[4]**

Q5) Write short notes on any 4 of the following: **[10]**

  a) Nano Fillers

  b) Polymerisation

  c) Types of CNT's (carbon nanotubes)

  d) Emulsion polymerisation

  e) Bio-degradable polymer

  f) Intrinsic conducting polymer

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[5822]-421

S.Y. B.Sc. (Nanoscience and Nanotechnology)
NS-242- Advanced Techniques for characterization of Nanomaterials
(2019 Pattern) (Credit System) (Semester-IV)
(Paper-II) (24262) (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 Q2 to Q5 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) State the principle of VSM.

   b) Enlist the parts of EDAX system.

   c) Define elastic & inelastic scattering.

   d) State any two limitations of SEM.

   e) Define ion milling process.

   f) Draw the diagram of bright field imaging mode.

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

     i) Draw a neat diagram of Fluorescence microscope & give it's advantages.

     ii) Define Josephson Junction. Also explain SQUIDs.

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

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

     i) Explain DSC- chemiluminescence system & DSC - photocalorimetry system.

     ii) With neat diagram explain scanning Electron Microscopy.

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

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

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

   ii) Write down the applications of SEM & TEM.

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

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

a) Principle of DSC analysis technique.

b) Fluorescent substances.

c) Applications of Confocal microscopy.

d) Principle of FESEM.

e) DC SQUIDs & RF SQUIDs.

f) Applications of EDAX.

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[5822]-422

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL - 241 : Analog Circuit Design

(CBCS 2019 Pattern) (Semester - IV) (24221) (Regular)

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) Attempt any five of the following. **[5]**
- a) What is small signal amplifier?
- b) List the various types of power amplifier.
- c) What are the different types of feedback system?
- d) Define the term voltage gain of an amplifier.
- e) What is thermal run away?
- f) How much is the percentage corrosion efficiency for class - B power amplifier with resistive load.

Q2) a) Answer the following.
- i) Calculate the maximum current pass through transistor amplifier if $V_{CC} = 30$ Volts, $R_C = 4k\Omega$ and $R_E = 5k\Omega$. **[2]**
- ii) Explain the public addrees system with block diagram. **[4]**

b) Draw and explain the schematic diagram of on Op-Amp based RC phase shift Oscillator. **[4]**

Q3) a) Answer the following.
- i) In an amplifier with gain A = 50, a negative feedback is applied through β network = 0.005 calculate the gain of an amplifier after feedback. **[2]**
- ii) Draw the circuit diagram of differentiator using op-amp. Derive an expression for its ouput voltage. **[4]**

b) Show that the conversion efficiency of class A amplifier with transformer coupled load is 50%. **[4]**

Q4) a) Answer the following.

       i)   Draw the neat labelled block diagram of audio amplifier.   **[2]**

       ii) Calculate the maximum & minimum frequency of oscillations of wein bridge oscillator for circuit having $R = 10k\Omega$, and $C = 1nF$ to 1000.nf.   **[4]**

    b) Explain the working of class A power amplifier with resistive load.   **[4]**

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

    a) Write a short note on ac load line.

    b) What is differentiator circuit? List the applications of differentiator?

    c) Write a short note on heat sink.

    d) Explain the effect of coupling capacitor on frequency response curve in an amplifier.

    e) Draw the neat labeled diagram of an integrator using op-amp and write its expression for output voltage.

    f) Power transistor dissipates 5 Watt energy. Its maximum junction temperature is $T_{jmax} = 80°C$. Find the maximum ambient temperature at which it can be operated with thermal resistance at θ_{jA} 10° C/Watt.

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[5822]-423

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL- 242 : Microcontroller and Python Programming

(CBCS 2019 Pattern) (Semester - IV) (Paper-III) (24222) (Regular)

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 Question No.5 carry equal marks.*

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

a) What is Arduino?

b) Write the syntax of digital write 'O' function of Arduino.

c) List types of Arduino board.

d) How can you delete a variable in python?

e) What are the python tuples?

f) How to call a function in python?

Q2) a) Answer the following

i) List the comparison operator in Arduino. **[2]**

ii) Explain if-else statment in python with example. **[4]**

b) Explain serial communication in Arduino. Write Arduino program for it. **[4]**

Q3) a) Answer the following

i) What is a dictionary in python? **[2]**

ii) Draw the architecture of microcontroller used in Arduino and explain ALU Block in detail. **[4]**

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

Q4) a) Answer the following.

   i) List any four applications of python programming. **[2]**

   ii) Explain LED blinking using Arduino with python programming. Write a python code for LED blinking. **[4]**

   b) Explain arithmatic operators in Arduino. **[4]**

Q5) Attempt any five of the following **[10]**

   a) Write any five features of microcontroller used in Arduino.

   b) Write a python code of multiplication of two numbers.

   c) Write a short note on string in python.

   d) Describe the assignment operator of python.

   e) Write a short note on 'for' statment in Arduino.

   f) List python data types. Explain any one in detail.

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[5822]-424

S.Y. B.Sc.

PSYCHOLOGY

Health Psychology

(2021 Pattern) (Semester - IV) (Paper - I) (Regular) (24201)

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 <u>Five</u> of the following: **[5]**

    a)   Define health Psychology.

    b)   Who gave the biopsychosocial 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 component of health.   **[6]**

<div align="center">OR</div>

        Explain the appraisal focused coping pattern.

    b)   Analyze the effects of stress on physical health.   **[4]**

Q3) a) Describe the mind body relationship model. **[6]**

OR

Discuss the various health compromising behaviors.

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

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

OR

Explain the sources and types of stress.

b) Analyze the holistic health & wellbeing. **[4]**

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

a) Biopsychosocial model.

b) Illness Management.

c) Happiness & health.

d) Catastrophic thinking.

e) Human virtues.

f) Life Satisfaction.

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[5822]-425

S.Y. B.Sc.

PSYCHOLOGY

Psychological Testing and Applications

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

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 Question 5 carry equal marks.

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

a) Define Intelligence.

b) Define attitude.

c) State the full form of TAT.

d) What is abnormal behavior?

e) Name the areas of marital adjustment.

f) Define Value.

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

<div align="center">OR</div>

Explain any two tests that assess neurological problems.

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

Q3) a) Describe any one career interest test with Psychometric properties. **[6]**

OR

Explain the applications of parent child relationship assessment.

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

Q4) a) Explain any one Psychological test of stress with their domain's and applications. **[6]**

OR

Describe any one family attitude scale with their domains and applications.

b) Evaluate any one job statisfaction scale and their usages. **[4]**

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

a) Musical Aptitude.

b) Vocational interest.

c) Application of anxiety test.

d) Application of social attitude assessment.

e) Advantages of projective techniques.

f) Organizational Committment.

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[5822]-426

S.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 241 : Biological Diversity and Its Conservation

(2019 Pattern) (Semester - IV) (Paper - I) (24241) (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 from 2 to 5 carry equal marks.*

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

    a)   Define Genetic level of biological diversity?

    b)   What is transgenic organisms?

    c)   Define land races.

    d)   What was the aim of Beej Bachao Andolan?

    e)   Write any two examples of Ex-situ conservation methods?

    f)   What is microbial remediation of pollution?

Q2) a)   Why Western Ghat in India is called as Hot-Spots?   **[6]**

    b)   Why species diversity is important.   **[4]**

Q3) a) Explain the factors affecting to global distribution of species Richness. **[6]**

b) Which are the major threats to biodiversity? **[4]**

Q4) a) Discuss the ecological significances of biodiversity? **[6]**

b) What is the need of conservation of biodiversity? **[4]**

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

a) Convention on biological diversity.

b) In-situ conservation.

c) Advances cultivars.

d) Endemism.

e) JFM.

f) Silent Valley Movement.

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[5822]-427

S.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 242 : Environmental Pollution Control Technology

(2019 Pattern) (Credit System) (Semester - IV) (Paper - II) (24242) (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 from 2 to 5 carry equal marks.*

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

   a)   Which absorbant is used for monitoring of SO_2?

   b)   Enlist the water sampling methods used in water monitoring.

   c)   Why the 'O' Horizon is absent in Desertic soil?

   d)   Anatomical waste like pathological Waste & Body parts are stored in which Coloured Bag?

   e)   What is Sound absorption?

   f)   Why inceneration is commonly used in waste reduction?

Q2) a)   What is secondary treatment? With neat labeled diagram explain process of UASB.   **[6]**

   b)   In ambient air quality monitoring what should be the main consideration of site selection.   **[4]**

P.T.O.

Q3) a) How particulate matters are monitered by using Respirable dust sampler.

[6]

b) Justify, two stage digesters are better than single stage digester. **[4]**

Q4) a) Define soil pollution? Explain methods which reduce dependancy on chemicals. **[6]**

b) With neat labeled diagram explain in details sanitary landfill. **[4]**

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

a) Noise proffing.

b) Gasification of solid waste.

c) Equipments used for soil monitoring.

d) Rotating contactors.

e) Respirable dust sampler.

f) Screening.

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[5822]-428

S.Y. B.Sc.

DEFENCE & STRATEGIC STUDIES

DS - 401 : International Security

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

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

Instructions to the candidates:

1) All questions are compulsory.

2) Figures to right indicate full marks.

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

a) Define 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.

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.

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[5822]-429

S.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 402 : Defence Economics

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

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

Instructions to the candidates:

1) All questions are compulsory.

2) Figures to the right indicate full marks.

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

   a)   Define Defence Budget.

   b)   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.

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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[5822]-430

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.

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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[5822]-431

S.Y. B.Sc.

ENGLISH : ABILITY ENHANCEMENT COURSE - AEC

AECC - IV : A Language English

(2019 Pattern) (Semester - IV) (24321) (Regular) (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) Attempt any one of the following in about 150 - 200 words: **[15]**

    a)   Comment on the appropriateness of the title of the story 'My Lost Dollar'.

    b)   How does Sarojini Naidu reflect the significance of the Natural world in the poem, 'The Bird Sanctuary'?

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

    a)   Write a note on 'content writing in social media platforms'.

    b)   As cultural head of your college, draft a notice for all the students informing them about the 'Cultural Day' celebration in your college.

    c)   You are the secretary of 'New Sports Club' in your town. The meeting of the office bearers of the club is scheduled on 5th of next month. Prepare an agenda for the meeting.

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

    a)   Explain the difference between soft skills & hard skills.

    b)   What is SWOT analysis? Discuss the basic elements of SWOT analysis.

    c)   Explain the different phases of Project Management.

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[5822]-432

S.Y. B.Sc.

MARATHI (मराठी)

मराठी साहित्य (AECC - IVB)

पाठ्यपुस्तक : मराठी कथा दर्शन

(2019 Pattern) (Semester - IV) (CBCS) (24331) (Regular)

(मराठी रूपांतर)

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) आनंदी जीवनाची गुरूकिल्ली

ब) पर्यावरण संवर्धनात युवकांची भूमिका

क) आजची शिक्षण पद्धती: एक चिंतन

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

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

ब) 'पुढल्या हाका' या कथेतून वैश्विक शांततेचा संदेश कसा प्रकट झाला आहे.

क) '15 ऑगस्ट 1947' या कथेतून स्वातंत्र्याची आकांक्षा कशी व्यक्त झाली आहे.

ड) 'एक शहर मेले' त्याची गोष्ट या कथेतील जैवविविधतेच्या संवर्धनाचा संदेश कसा व्यक्त झाला आहे.

इ) 'ओझं' या कथेतील दुष्काळग्रस्त ग्रामीण जीवनातील वास्तव स्पष्ट करा.

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

अ) देवराव या शेतमजूराची व्यथा 'नांगरट' या कथेच्या आधारे उलगडून दाखवा.

ब) 'कांचनमृग' या कथेचे कथानक तुमच्या शब्दांत लिहा.

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[5822]-433

S. Y. B.Sc.

AECC - IVC : LANGUAGE HINDI (हिंदी)

हिंदी काव्य तथा कहानी साहित्य

(2019 Credit Pattern) (Semester - IV) (Regular) (24341)

समय : 2 घंटे]   *[पूर्णांक : 35*

सूचना :   1)   सभी प्रश्न अनिवार्य हैं।

2)   दाहिनी ओर लिखे अंक प्रश्नों के पूर्णांक हैं।

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

अ)   'खूब लड़ी मर्दानी वह तो झाँसी वाली रानी थी' ऐसा कवियत्री ने क्यों कहा है?

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

क)   'गीतफरोश' कविता का आशय स्पष्ट कीजिए।

ड)   'मेरे देश की संसद मौन है' ऐसा कवि धूमिल क्यों कहते है?

इ)   'भूख' कविता के माध्यम से कवि क्या संदेश देना चाहते है?

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

अ)   सुनंदा का चरित्र–चित्रण कीजिए।

ब)   'बेटा' कहानी के माध्यम से अनमेल विवाह की समस्या पर प्रकाश डालिए।

क)   पानाराम एक विद्रोही दलित पात्र है, स्पष्ट कीजिए।

ड)   अमोल के स्वेटर संबंधित मुहल्लेवालों ने कौन–कौन से अनुमान लगाए थे?

इ)   'ईश्वर का द्वन्द्व' कहानी का सारांश अपने शब्दों में लिखिए।

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

अ)   पानाराम सरपंच जसवीर सिंह के पास कौन–सी शर्त रखता है?

ब)   कवि भवानी प्रसाद मिश्र अपने गीत क्यों बेचना चाहते हैं?

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[5822]-434

S.Y. B.Sc.

SANSKRIT (Regular)

AECC-IV E: Gīrvaṇābhāratī (24351)

गीर्वाणभारती (निवडक संस्कृत वेचे)

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

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

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

Q1) Write an answer in 2-4 lines on the following questions.   **[16]**

पुढील प्रश्नांची दोन ते चार ओळीत उत्तरे लिहा.

i)   From which original text saddharampundarika story has taken?

सद्धर्मपुण्डरीक कथा ही कोणत्या मूळ ग्रंथातून घेतली आहे?

ii)   Which are called as Nāstika Darsánas?

नास्तिक दर्शने कोणती?

iii)   Which is the root in word शास्त्र?

शास्त्रशब्दातील मूळ धातू कोणता?

iv)   State the names of any two applied sciences.

व्यवहारोपयोगी शास्त्रे सांगा– कोणतीही दोन

v)   State the types of Khanitras.

खनित्राचे प्रकार सांगा.

vi)   State the Sanskrit definition of आयुर्वेद

आयुर्वेद शब्दाची संस्कृत व्याख्या लिहा.

vii)   Who is the author of 'शिवमानसपूजा स्तोत्रम्'

'शिवमानसपूजा' स्तोत्राचे रचयिता कोण?

viii)   Fill in the blank विनयात् संसाधयेत्............।

रिक्त जागा भरा विनयात् संसाधयेत् ....।

P.T.O.

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

टीपा लिहा (कोणत्याही दोन)

   i)   पुण्डरीक Pundarīka

   ii)   गणितशास्त्रम् – Gaṇitaśāstram

   iii)   वनस्पतिशास्त्र – Vanaspatiśāstram

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

टीपा लिहा (कोणत्याही दोन) :

   i)   धीर: समयं प्रतिक्षेत – Explain this line

        धीर: समयं प्रतिक्षेत – ही ओळ स्पष्ट करा.

   ii)   शिवमानसपूजा – Śivamanasapūjā

   iii)   रामायण – Rāmayaṇa

Q4) Write in detail (any one) :   **[8]**

सविस्तर उत्तर लिहा. (कोणत्याही एकाचे) :

   i)   Write सद्धर्म पुण्डरीक कथा in your own words.

        सद्धर्म पुण्डरीक कथा तुमच्या भाषेत लिहा.

   ii)   Write any two advices from उपदेशप्रबन्ध:

        उपदेशप्रबन्ध मधील कोणतेही दोन उपदेश स्पष्ट करा.

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[5822]-435

S.Y.B.Sc.

AECC-IV D-LANGUAGE : ARABIC FUNCTIONAL

(2019 Pattern) (Credit System) (Semester - IV) (24371) (Regular)

Time : 2 Hours]   [Max. Marks : 35

Instructions to the candidates:
  1)   ***Attempt all questions.***
  2)   ***Figures to the right side indicate full marks.***

Q1) Translate into Eng./Urdu/Marathi any <u>two</u> of the following Passages:**[10]**

(الف)   هٰذا جَمَلٌ۔ ذَالِكَ كَلْبٌ ۔ ذَالِكَ فَرَسٌ ۔ هٰذاكِتابٌ ۔ اَنا وَلَدٌ ۔

اَنت وَلَدٌ۔ اَنا كَبيرٌ۔ اَنت صَغيرٌ ۔ اَلقُرآنُ كِتابٌ ۔ اَلكِتابُ عَرَبِيٌّ ۔

اَلعِلمُ مفِيدٌ۔

(ب)   اَلاسِلاَمُ دينٌ ۔ اَلاَدَبُ واجِبٌ ۔ اَلدّرسُ سَهْلٌ ۔ اَلجَمَلُ طَويلٌ ۔

اَلبَيْتُ جَميلٌ۔ اَلزّهُرُ صَغيرٌ ۔ اَلشَجَرُ كبيرٌ۔ اَللّعِبُ ضَرُورِيٌّ۔

اَلعَمْدُ ثابِتٌ لَلّهِ۔ اَلقُراٰنُ هِدايَةٌ لِلاٰ نِسانِ۔

(ج)   اَلاُستاذُ جالِسٌ عَلى الكُرسِيِّ۔ اَلوَلَدُ واقِفٌ عَلَى الاَرضِ ۔

اَلقَلَمُ لازِمٌلِلكِتابَةِ۔ والكِتابُ لازِمٌ لِلقِراءَ ةِ ۔ اَلعِلمُ نِعْمَةٌ لِلاِنسانِ

اَلدّرسُ سَهْلٌ لِلوَلَدِ۔

P.T.O.

Q2) Translate and explain the poem "عِيدُالفِطْرِ" in Urdu/Eng./Marathi: **[10]**

عِيدُ الفِطْرِ ۔ يَومُ اَلْبَرِّ۔

نَخْتِمُ فِيهِ۔ صَومِ الشَّهَرِ۔

نَلْبِسُ فَرحًا ۔ حُلَلَ اَلْبُشْرِ۔

نَرْتَعُ نَلهُو۔ نَلعبُ نَجرى۔

نُسعِدُ فِيهِ ۔ اَهْلَ الَعُسرِ۔

وَنُجَنِّنهُمْ۔ مَسَّ الّضُرِّ۔

قَدْ عَوّدَنَا۔ دِينُ اَلْبِرِّ۔

اَنْ نَمْسَهَحُمْ ۔ بِيَدِاليُسَرَ۔

مَرحًى مَرحًى ۔ مُسدِى الخَيرِ۔

كُن مِعوآنًا۔ لِلمُضطَرِّ۔

وَارحَمْ تَغْنَمْ ۔ خَيَرِالاَجرَ۔

Q3) Answer the following in Arabic Only: **[10]**

١) مَاذَالِكَ؟

٢) مَنْ هٰذا؟

٣) اَينَ الزّهْرُ؟

٤) هَلْ هٰذا كِتابٌ؟

٥) كَيْفَ الزّهْرُ؟

Q4) Write the Arabic Term of week days: "اَيّامُ الاَسبوعٍ" **[5]**

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[5822]-436

S.Y. B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION
CHNA 241 : Network Fundamentals
(CBCS 2019 Pattern) (Semester-IV) (Paper-III) (24871)

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.   **[5×1=5]**

     a)   Define computer Networking.

     b)   Write uses of HTTP protocol.

     c)   What are the roles of windows server 2003 system in a Network?

     d)   What are UTP & STP cables used for?

     e)   What is star Topology?

     f)   Write Long form of WINS.

Q2) a)   i)   What are the steps in installing a server operating system.   **[2]**

           ii)   Write a short Note on HTTP protocol and FTP protocol.   **[4]**

     b)   Explain physical and Logical Topology.   **[4]**

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

           ii)   Explain OSI model.   **[4]**

     b)   Explain server-client based network.   **[4]**

Q4) a) i) Write a Difference between base band & Broad band transmission . **[2]**

ii) Explain Analog and Digital transmission **[4]**

b) Explain any two network protocol's. **[4]**

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

a) Write a short Note on Cable crimping.

b) What is Network Interface card?

c) Define a concept of Server, client and host.

d) Write advantages of Fiber optic cable.

e) What are the advantages of networking.

f) Write short note on cloud Networking.

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[5822]-437

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

Time : 2 Hours]   *[Max. Marks : 35*
Instructions to the candidates:
  1)   Q.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 PAN.

   b)   What do you mean by peripheral devices?

   c)   What are add-on cards?

   d)   What is mother board?

   e)   What is function of RAM?

   f)   Write different input devices.

Q2) a)   i)   What is full form of DVD? what is its storage capacity?   **[2]**

            ii)   Explain the concept of Thick and Thin PC.   **[4]**

      b)   Describe the concept of speech synthesis.   **[4]**

Q3) a)   Explain the detail the concept of Green PC.   **[6]**

      b)   Compare wired and wireless communication protocol.   **[4]**

Q4) a) i) Explain the brief asynchronous serial communication protocol. **[2]**

ii) What is Wi-Fi? State applications of Wi-Fi. **[4]**

b) Explain the concept of multimedia PC. **[4]**

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

a) BIOS

b) MIDI Ports

c) Windows 8 operating system

d) Remote desktop sharing tools

e) Sound cards

f) Computer networks

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[5822]-438

S.Y. B.Sc. (Vocational)
BIOTECHNOLOGY
VBt-221 : Genetic Engineering
(2019 CBCS Pattern) (Semester-IV) (Regular) (24571) (Paper-III)

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

Instructions to the candidates:

1) *Q.1 is compulsory.*
2) *Solve any three from Q.2 to Q.5*
3) *Q.2 to Q.5 carry equal marks.*
4) *Draw neat labelled diagrams wherever necessary.*

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

a) Define clone.

b) Name any two selectable markers of YAC vector.

c) Give any one application of PCR.

d) What is meant by expression vector?

e) Name the enzymatic method of DNA Sequencing.

f) On What basis do Proteins get separated in SDS-PAGE?

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

i) With the help of an example explain the concept of insertional inactivation.

ii) Describe the mechanism of action of Cry protein.

iii) What is meant by chain termination method? Why does new strand synthesis stop wher dideoxyribonucleatide is added by DNA polymerase in Sangers method of DNA sequencing?

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

i) Describe the particle gun method in detail.

ii) Write a short note on DNA ligases and its role in r-DNA technology.

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

       i) Explain BAC vector in detail.

       ii) Describe the basic steps involved in gene cloning.

       iii) Explain Pyrosequencing method in detail.

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

       i) Explain the procedure of Northern blotting.

       ii) Describe the nomenclature of restriction endonucleases in detail.

Q4) a) Answer any 2 of the following: **[6]**

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

       ii) Give any 3 features of cosmids.

       iii) Write a short note on recombinant vaccines.

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

       i) Explain the steps involved in PCR.

       ii) Diagramatically describe any one non-radioactive labelling method in detail.

Q5) Write short notes on any 4 of the following: **[10]**

   a) Role of primers in PCR.

   b) Differences between cloning vectors and expression vectors.

   c) Role of any 2 chemicals used in Maxam Gilbert method of DNA sequencing.

   d) Applications of western blotting.

   e) Applications of r-DNA technology in industry.

   f) Role of DNA ligases and restriction endonucleases in r-DNA technology.

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[5822] - 439

S.Y.B.Sc. (Vocational)
BIOTECHNOLOGY
VBt - 222 : Bioinformatics
(2019 CBCS Pattern) (Semester - IV) (24572) (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) *Q. 2 to Q.5 carry equal marks.*
4) *Draw diagram wherever necessary.*

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

    a)   Give full form of BLAST.

    b)   Name any one nucleic Acid sequence database.

    c)   What is prosite.

    d)   Define Homologues.

    e)   What is SRS.

    f)   Give full form of NCBI.

Q2) A)   Answer the following (Any Two)   **[6]**

    a)   Define Bioinformatics? Give application of Bioinformatics invarious fields.

    b)   What are literature databases? Add a note on any one literature database.

    c)   What are derived databases.

    B)   Answer the following (Any One).   **[4]**

    a)   Write a note on Extraction of knowledge from Databases on Innusology.

    b)   Explain in detail BLOSUM series.

P.T.O.

Q3) A) Answer the following (Any Two) **[6]**

   a) What are scoring Matrices. Explain matrices for nucleic Acids.

   b) Explain is detail basic concept of Specalized Gerome databases.

   c) Explain in detail keyword based Entrez.

   B) Answer the following (Any One). **[4]**

   a) Explain in detail principles on which matrices are derived.

   b) Explain in detail basic concept of sequence Identity.

Q4) A) Answer the following (Any Two) **[6]**

   a) Explain in detail PLOS.

   b) Explain in detail SWISS - PROT.

   c) Discuss in detail patterns identification in given sequences.

   B) Answer the following (Any One). **[4]**

   a) What are Bibliographic databases. Give their application in study of bioinformatics.

   b) Explain indetail databases for viral geromes.

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

   a) DDBJ

   b) Organization of data.

   c) SCOP

   d) PubMed

   e) PIR - PSD.

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[5822] - 440

S.Y.B.Sc. (Vocational)
SEED TECHNOLOGY
ST - 2.4 : Vegetable Seed Production
(2019 CBCS Pattern) (Semester - IV) (2 Credits) (24891) (Paper - III)

Time : 2 Hours]   *[Max. Marks : 35*
Instructions to the candidates:
1) *Q.1 is compulsory.*
2) *Solve any three questions from Q.2 to Q.5.*
3) *Questions 2 to 5 carry equal marks.*

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

    a)   What is Roughing?

    b)   Define Nursery Management.

    c)   Enlist the types of Pollination.

    d)   What is the Intervarital Hybridization?

    e)   Give the isolation distance for Onion.

    f)   Write any two control measures for fruit borer in Brinjal.

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

    b)   Explain the Hi-tech Nursery and Soil less raising of seedlings.   **[4]**

Q3) a)   Describe the garden for Vegetable Processing.   **[6]**

    b)   Explain the advantages and disadvantages of Pure Line Selection.   **[4]**

Q4) a)   Write Vegetable crops based on plant part used for consumption.   **[6]**

    b)   Write down the procedure for Hybridization.   **[4]**

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

   a) Types of emasculation.

   b) Precaution in Raising of in Healthy Seedlings.

   c) Plant protection.

   d) Cultural practices in Okra.

   e) Objectives in Pure Line Selection.

   f) Explain flat beds.

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[5822]-441

S.Y. B.Sc.(Vocational)
SEED TECHNOLOGY
ST - 2.5 : Seed Quality Control
(CBCS 2019 Pattern) (Semester - III) (Paper - IV) (24892)

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

Instructions to the candidates:

    1) Question 1 is compulsory.

    2) Solve any three questions from Que. 2 to Que. 5.

    3) Questions 2 to 5 carry equal marks.

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

    a)   Give any two objectives of seed certification.

    b)   Write any two duties of seed inspector.

    c)   Define sanctioning legislation.

    d)   Define trap crop.

    e)   Define Seed quality.

    f)   Define field inspection.

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

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

Q3) a)   Explain in detail Central Seed Committee.   **[6]**

    b)   Explain Vermi compost & Biological Control.   **[4]**

P.T.O.

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

b) Give method of field inspection. **[4]**

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

a) Seed legislation in India.

b) Appellate authority.

c) Concept of seed quality.

d) Foundation seed and Certified Seed.

e) Seed certification agencies.

f) Power of seed inspector.

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[5822]-442

S.Y. B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
VOC.IND-IMB-221 : Microbial Fermentation and
Down -Stream Processing
(2019 CBCS Pattern) (Semester-IV) (Paprt-III) (24821)

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 is salting out of protein?
    b)   What is downstream processing?
    c)   What are bioinoculants?
    d)   What is the principle of chromatography?
    e)   _____organism is used for production of streptomycin.
    f)   Vitamin B_{12} is produced as a byproduct of _____.

Q2) a)   Attempt any three of the following.   **[6]**
      i)   Draw a well - labelled diagram dipicting affinity chromatography.
      ii)   Describe process of sedimentation.
      iii)   Write a short note on centrifugation.
      iv)   Explain in brief the principle and working of Gel permeation chromatography using a diagram.
    b)   What is function of rennet used in cheese production? Draw a flow chart for cheese production.   **[4]**

Q3) a)   Attempt any three of the following: **[6]**
      i)   Draw a flow chart for penicillin production.
      ii)   Describe Acetic acid production process.
      iii)   What is membrane filtration?
      iv)   What is the commercial application of anylase in industry?
    b)   Write a short note on cell disruption.   **[4]**

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

    i) Assuming your product is intracellular draw a downstream processing flow chart.

    ii) State any five commercial formentation products along with their producer organism.

    iii) What is SCP? State example.

    iv) Which techniques can be used for characterization of products?

  b) Which methods can be used for separation of biomass. **[4]**

Q5) Write Short notes on any Four of the following.

  a) MALDI

  b) X - ray diffraction

  c) Formulation of product

  d) Packaging & sales of product

  e) Liquid extraction of product

  f) Dialysis

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[5822]-443

S.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

IND - IMB - 222 : Quality Assurance in Industrial Product

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

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

Instructions to the candidates:

1) *Q1 is compulsory.*

2) *Solve any three questions from Q2 to Q5.*

3) *Q2 to Q5 carry equal marks.*

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

a)   WHO stands for _____

b)   Enlist the microorganisms used in bioassay of Glutamic acid.

c)   Who publishes pharmacopeia?

d)   Define toxicity.

e)   Explain the significance of shelf life of a product.

f)   Explain the role ISO standards in pharmaceutical industry.

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

i)   Discuss the importance of controls in sterility testing.

ii)   Describe the method of performing bioassay of penicillin.

iii)   Describe <u>in-vetro</u> tests of carcinogenic substances.

iv)   Discuss about the shelf life of cheese.

b)   Write the significance of CGMP.   **[4]**

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

  i) Explain the role of FDA in pharmaceuticla industries.

  ii) Which Quality assurance test are to be performed for testing quality of lotions?

  iii) Draw neat and labeled flow diagram for the process of pyrogen testing of product.

  iv) Enlist the quality assurance tests recommended for testing of dairy products.

  b) Explain the concept of USP and discuss its necessity. [4]

Q4) a) Attempt any three of the following. [6]
  i) Describe the role of ISI standards.
  ii) Explain the difference between BP and IP.
  iii) Explain the importance of sterility testing of vitamin.
  iv) Elucidate the process of allergen testing.
  b) What are FPO standard? Explain their role in industries. [4]

Q5) Write short notes on any four of the following. [10]
  a) WHO's role in pharmaceutical GMP.
  b) Bioassay for Amylase.
  c) FDA standards of mineral water.
  d) Carcinogenicity testing of creams.
  e) Standards for bioinoculants.
  f) Monographs.

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[5822] - 444

S.Y.B.Sc. (Vocational)
ELECTRONIC EQUIPMENT MAINTANANCE
VOC - EEM - 241 : Basic level Maintenance of Home & Community Equipment
(2019 CBCS Pattern) (Semester - IV) (Paper - III) (24811)

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

Instructions to the candidates:
1) *Q. No. 1 is compulsory.*
2) *Solve any three questions from Q. No. 2 to 5.*
3) *Q. No. 2 to 5 carry equal marks.*

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

   a) What is submersible pump?

   b) How impurities are removed from water in water treatment plant?

   c) What is hydraulic elevator?

   d) Who made first washing machine?

   e) Which type of motor is used in washing machine?

   f) What is function of pyranometer?

Q2) a) Answer the following.   **[6]**

     i) Describe the working principle of water pump.

     ii) How to maintain water pump routinely?

   b) Draw the functional block diagram of water treatment plant. Explain its working in brief.   **[4]**

Q3) a) Answer the following.   **[6]**

     i) Explain the role of microcontroler in washing machine.

     ii) Describe the efficient and failure safe operation of washing machine.

   b) What is the difference between elevator and escalator? Give their application areas. Describe failure - safe operation of elevator.   **[4]**

Q4) a) Anwer the following.   **[6]**

   i)   What are the types of generators? Explain the working priniples of any one of them.

   ii) What is alternator? What is its role in generator?

   b) Draw the functional block diagram of solor plant. Also explain its working.
                                                                                                    [4]

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

   a) Describe self priming in water pumps.

   b) Write a note on different chemicals used in water treatment plant.

   c) Describe the function of different safty devices used in elevator.

   d) Give a brief account of recent developments in elevator.

   e) How a voltage is controlled in generator?

   f) Give two application areas of small solar plant.

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[5822]-445

S.Y. B.Sc. (Vocational)
ELECTRONIC EQUIPMENT MAINTENANCE
VOC-EEM-242: Computer based Electronic Equipment Design
(CBCS 2019 Pattern) (Semester-IV) (Paper-IV) (24812)

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

a) Give the acronym used for DTA.

b) What do you mean by xbee?

c) What is half - duplex in Ethernet?

d) Name the tool used for real time data analysis

e) Define the term matplotlib.

f) List any two applications of ultrasonic sensor.

Q2) Answer the following.

a) i) Mention any two examples of real time data processing system.**[2]**

ii) Write a short note on ECG machine **[4]**

b) Explain computer based electronic equipment with the help of block diagram. **[4]**

Q3) Answer the following:

a) i) Give the use of fiber optic cable in ethernet. **[2]**

ii) Explain the steps used in xbee configuration **[4]**

b) Write a short note on Python programming. **[4]**

Q4) Answer the following:

    a)   i)   Mention any two similarities between CAT-5 & CAT -6 cables used in ethernet connection. **[2]**

         ii)   Explain in short limitations of arduino programming **[4]**

    b)   Explain the steps in installation of matplotlib. **[4]**

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

    a)   Working principle of DTA

    b)   Matplotlib functions for drawing various plots.

    c)   BMP 280 sensor

    d)   Spectrophotometer

    e)   PIP in python programming.

    f)   Importance of real time data analysis