P304　　　　　　　　**[3717] - 501**

S.Y. B.Sc.

MATHEMATICS
MT - 211 : Linear Algebra - I
(Sem. - I) (Old Course)

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

Instructions to the candidates :

　　1)　All questions are compulsory.

　　2)　Figures to the right indicate full marks.

Q1) Answer the following questions :　　　　　　　　　　**[10]**

　　a)　Find the parametric equation for the line L passing through the points A(1, 2, 3) and B(5, 4, 2).

　　b)　Show that the system $x + 3y = 1$, $2x + 6y = 3$ has no solution.

　　c)　If $\bar{u} = (3, 0, 4)$ and $\bar{a} = (2, 3, 3)$, find $\text{Proj}_{\bar{a}}\bar{u}$.

　　d)　Define an elementary matrix.

　　e)　Is the set $S = \{(2, 1, 3), (-1, 1, 2), (0, 0, 0)\}$ of vectors in R^3 linearly dependent?

　　f)　Find the co-ordinates of vector $\bar{v} = (1, 2)$ relative to basis

　　　　$B = \{(0, -1), (1, -1)\}$ in R^2.

　　g)　If $A = \begin{bmatrix} 2 & 0 \\ -3 & 1 \end{bmatrix}$, find elementary matrices E_1 and E_2 such that $E_1 E_2 A = I_2$.

　　h)　Let $T : R^3 \to R^2$ be a linear transformation such that $T(1, 0, 0) = (0, 0)$, $T(0, 1, 0) = (1, 1)$, $T(0, 0, 1) = (1, -1)$, Compute $T(4, -1, 1)$.

　　i)　Is x-axis a subspace of R^2? Justify.

　　j)　Determine whether the map $T : R^2 \to R^2$ is a linear transformation defined by $T(x, y) = (y, x + 1)$.

Q2) Attempt any two of the following : **[10]**

    a)   Define invertible matrix. Prove that if A and B are invertible matrices of same order then AB is invertible and $(AB)^{-1} = B^{-1}A^{-1}$.

    b)   Compute the inverse of A by Gaussian elimination method, where

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & -4 \\ -4 & 1 & 1 \end{bmatrix}.$$

    c)   For which real values of λ do the following vectors form linearly dependent set in R^3?

$$\bar{u}_1 = \left(\frac{-1}{2}, \frac{-1}{2}, \lambda \right), \ \bar{u}_2 = \left(\lambda, -\frac{1}{2}, -\frac{1}{2} \right), \ \bar{u}_3 = \left(-\frac{1}{2}, \lambda, -\frac{1}{2} \right).$$

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

    a)   Let V be an n-dimensional vector space then prove that any set with n linearly independent vectors in V is a basis for V.

    b)   Determine the dimension and basis for solution space of system.

$$x_1 + 2x_2 + 7x_3 = 0$$
$$-2x_1 + x_2 - 4x_3 = 0$$
$$x_1 - x_2 + x_3 = 0$$

    c)   If $T : R^3 \to R^3$ is a linear transformation given by

$$T(x, y, z) = (x + y - z, x - 2y + z, -2x - 2y + 2z),$$

find basis and dimension of Ker(T).

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

    a)   Prove that, if $T : V \to W$ is a linear transformation from an n-dimensional vector space V to a vector space W, then rank(T) + nullity (T) = n.

    b)   i)   For any two vectors $\bar{u}, \bar{v}$ in R^n, prove that $|\bar{u}.\bar{v}| \le \|\bar{u}\| \|\bar{v}\|$.

          ii)   Let $S = \{\bar{e}_1, \bar{e}_2\} = \{(1,0),(0,1)\}$ be basis of R^2 and map $T : R^2 \to R^3$ defined as $T(\bar{e}_1) = (1,0,1)$, $T(\bar{e}_2) = (-1,0,1)$. Compute $T(2\bar{e}_1 - 2\bar{e}_2)$. Also determine the nullity and the rank of T.

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P305   **[3717] - 502**

S.Y. B.Sc. (Sem. - I)

MATHEMATICS

MT - 212 : Calculus of Several Variables

(Paper - II) (Old Course)

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

Instructions to the candidates :

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

Q1) Attempt the following questions.   **[10]**

    a)   Examine whether the following limit exists.

$$\lim_{(x,y) \to (0,0)} \frac{xy}{x^4 + y^4}.$$

    b)   If $u = x^y + y^x$; find $\dfrac{\partial u}{\partial y}$.

    c)   Test whether $u = (2x^2 + 2y^2)(\log x - \log y)$ is a homogeneous function. Find it's degree if it is homogeneous.

    d)   If $u = x^3 + y^3$ where $x = a\cos t$, $y = b\sin t$; find the value of $\dfrac{du}{dt}$.

    e)   State Taylor's theorem for a function of two variables.

    f)   Find the stationary points of $f(x, y) = xy + \dfrac{1}{x} + \dfrac{1}{y}$.

    g)   Determine the critical points of $f(x, y, z) = xyz$ with the side condition $xy + yz + zx = 3k^2$, $k > 0$.

    h)   Change the order of integration of

$$\int_0^1 \int_x^1 f(x,y)\,dx\,dy.$$

i) Evaluate $J = \dfrac{\partial(x, y)}{\partial(u, v)}$ under the transformation $x = au$, $y = bv$.

j) Evaluate $\displaystyle\int_0^2 \int_0^{\frac{x^2}{4}} xy\,dx\,dy$

Q2) Attempt any two of the following: **[10]**

a) If a function $f(x, y)$ is differentiable at (a, b), prove that $f_x(a, b), f_y(a, b)$ exist.

b) Find $f_{xy}(0, 0)$ for the following function $f(x, y) = x^2 \tan^{-1}\dfrac{y}{x} - y^2$

$\tan^{-1}\dfrac{x}{y}$, if $xy \neq 0 = 0$, if $xy = 0$.

c) If $w = f(u, v)$, $u = x + y$, $v = x - y$; show that $\dfrac{\partial w}{\partial x} + \dfrac{\partial w}{\partial y} = 2 \cdot \dfrac{\partial w}{\partial u}$.

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

a) State and prove Euler's theorem for homogeneous functions.

b) Find the three numbers whose sum is 24 and the product of first by the square of second by the cube of the third is maximum.

c) Change the order of integration and hence evaluate,

$$\int_0^1 \int_x^1 e^{\frac{x}{y}}\,dy\,dx.$$

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

a) i) Show that:

$$\tan^{-1}\frac{y}{x} = \frac{\pi}{4} - \frac{1}{2}(x-1) + \frac{1}{2}(y-1) + \frac{1}{4}\left[(x-1)^2 - (y-1)^2\right] + \ldots$$

   ii) Evaluate $\displaystyle\iint_R (x+y)\,dx\,dy$ where R is the rectangle bounded by the lines $x = 1$, $x = 2$, $y = 3$, $y = 5$.

b)   i)   Evaluate $\displaystyle\int_{\phi=0}^{\frac{\pi}{2}}\int_{\theta=0}^{\alpha}\int_{r=0}^{2a} r^3 \sin\theta \, dr \, d\theta \, d\phi$.

ii)   Evaluate $\displaystyle\int_R e^{-\left(x^2+y^2\right)} dx \, dy$, where R is the region $x^2 + y^2 \leq 25$.

P306   **[3717] - 503**

S.Y. B.Sc. (Sem. - I)
MATHEMATICS
MT - 213 & MT - 214
MT - 213 : Ordinary Differential Equation
(Old Course) (Paper - III)

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

Instructions to the candidates :

1) *Candidates are advised to see the relevent question paper and solve the same.*
2) *All questions are Compulsory.*
3) *Figures to the right indicate full marks.*

Q1) Answer the following questions.   [10]

a) Define normal differential equation.

b) Determine unique solution of the initial value problem

$y - y = 0;$ $y(0) = 4$, $y(0) = 2$, given that e^x and e^{-x} are solutions of the equation.

c) Using Wronskian prove that the functions xe^x and e^x are linearly independent.

d) If $f(D) = D - x$, $g(D) = D + x$, compute $f(D).g(D)$.

e) Verify that $y = x^3$ is a solution of the equation $x^2y + xy - 9y = 0$.

f) Find particular solution of the equation $(D^3 + 2D^2 + D - 1) y = e^{-2x}$.

g) Solve the differential equation $\dfrac{d^4y}{dx^4} = 2\dfrac{d^2y}{dx^2}$.

h) Find the condition satisfied by 'P and Q', if e^{-x} is a solution of the equation

$\dfrac{d^2y}{dx^2} + \dfrac{dy}{dx} + Qy = 0$.

i) State existence and uniqueness theorem for solution of the initial value problem for the system of first order differential equations.

j) Verify that $x = 2e^{4t}$ and $y = 3e^{4t}$ is a solution of the system $\dfrac{dx}{dt} = x + 2y$;

$\dfrac{dy}{dt} = 3x + 2y$.

Q2) Attempt any two of the following: **[10]**

a) Prove that $\dfrac{1}{D^2 + a^2} \sin ax = -\dfrac{x}{2a} \cos ax$.

b) Let the functions $f_1, f_2, f_3, \ldots\ldots, f_n$ are $(n-1)$ times differentiable on an interval I. Prove that Wronskian W vanishes on I if these functions are linearly dependent.

c) Solve the differential equation $(D^2 + 3D + 2)y = 1 + 3x + x^2$.

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

a) Explain the method of reduction of order to solve the second order equation $y'' + y' + Qy = R$.

b) Solve the equation $\dfrac{d^2 y}{dx^2} + y = x\, e^{2x}$.

c) Solve the equation $(D + 1)^2 y = e^{-x} \cos x$.

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

a) i) Solve the differential equation $\dfrac{d^3 y}{dx^3} - \dfrac{dy}{dx} = 3e^{2x}$ by method of undetermined coefficients.

ii) If $y_1 = x$ is a solution of the equation

$x^2 y'' - 3xy' + 3y = 0$, find its general solution.

b) i) Solve the differential equation $(x-1)y'' - xy' + y = 1$ given that $y = e^x$ is a solution of the equation $(x-1)y'' - xy' + y = 0$

ii) Solve the equation $(x-1)\dfrac{d^2 y}{dx^2} - x\dfrac{dy}{dx} + y = (x-1)^2$ by variation of parameter method, given that x and e^x are solutions in complementary function.

P306   **[3717] - 503**

S.Y. B.Sc. (Sem. - I)
MATHEMATICS
MT - 214 : Numerical Analysis
(Old Course) (Paper - IV)

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

Instructions to the candidates :

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Use of non programmable scientific calculator is allowed.*

Q1) Answer the following questions.   **[10]**

a) Show that the equation $x^6 - 2x^2 + 3x - 4$ has at least two imaginary roots.

b) Estimate the first approximation to the root of the equation $x^2 - 5x + 3 = 0$, by Newton - Raphson formula. Take $x_0 = 0.5$.

c) Show that   .

d) Evaluate $\quad {}^{10}\left[\left(1 - 3x^4\right)\left(1 - 2x^3\right)\left(1 - 5x^2\right)\left(1 - 7x\right)\right]$.

e) State normal equations to fit a second degree polynomial
$y = a + bx + cx^2$.

f) Find first two strum's functions for the function
$$f(x) = x^4 - 3x^3 - 2x^2 + 7x + 3.$$

g) Evaluate $\int_0^{\pi/4} \mathrm{Tan}\,x\, dx$ by Trapezoidal rule from the following table:

x :	0	$\pi/8$	$\pi/4$
Tan$x$:	0	0.4141	1

h) State Simpson's $\dfrac{1}{3}^{\mathrm{rd}}$ rule for numerical integration.

i) Using Euler's method, find $y(0.1)$. Given that $\dfrac{dy}{dx} = x^2 + y^2$, $y(0) = 1$ and $h = 0.1$.

j) State Lagrange's interpolation formula for unequal intervals.

Q2) Attempt any <u>two</u> of the following. **[10]**

    a)   Explain the least square method to fit a straight line $y = a + bx$.

    b)   Find the number and position of the real roots of the equation

        $x^3 + 3x^2 - 1 = 0$.

    c)   Solve the following system of equations:

        $27x + 6y - z = 85, \qquad 6x + 15y + 2z = 72$

           $x + y + 54z = 110$

        by Gauss's - Seidal iteration method. (take two iterations).

Q3) Attempt any <u>two</u> of the following. **[10]**

    a)   Explain Newton - Gregory formula for forward interpolation.

    b)   Represent the polynomial $3x^3 + x^2 + x + 1$ and their successive differences in factorial notation.

    c)   Express the function $\dfrac{3x^2 + x + 2}{(x-1)(x-2)(x-3)}$ as sums of partial fractions using Lagrange's interpolation formula.

Q4) Attempt any <u>one</u> of the following. **[10]**

    a)   Solve the equation $\dfrac{dy}{dx} = x + y$ subject to the condition $y = 1$ when $x = 0$ by Picard's method and hence find the approximate value of y when $x = 0$. [Take 3 approximations].

    b)   i)   State general Quadrature formula and hence derive Trapezoidal rule for numerical integration.

          ii)   Using Euler's method, solve $\dfrac{dy}{dx} - 1 = y^2$. Given that $y(0) = 0$. Take $h = 0.05$ and obtain $y(0.05)$, $y(0.1)$ and $y(0.15)$.

P309 **[3717] - 506**

S.Y. B.Sc.
CHEMISTRY
CH - 211 : Physical Chemistry
(Sem. - I) (Old) (21311)

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

Instructions to the candidates :

 1) *All questions are compulsory.*

 2) *Figures to the right indicate full marks.*

 3) *Use of logarithmic table and calculator is allowed.*

 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following : [10]

 a) Give the limitations of third law of thermodynamics.

 b) Write the relation between K_p & K_c.

 c) What do you mean by cell & cell addresses in MS-EXCEL?

 d) Give a application of clapeyron equation.

 e) State Nernst distribution law.

 f) What are the azeotropic mixtures?

 g) Define the entropy, give its unit.

 h) Give the relation between Helmholtz free energy and Gibb's free energy.

 i) Define the term molality.

 j) What is a solution?

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

 i) Show that on mixing of two ideal gases the entropy of the system always increases.

 ii) What are the applications of MS-EXCEL?

 iii) Explain the properties and significance of change in Gibb's free energy.

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

   i) The vapour pressure of benzene is 1.53×10^4 Nm^{-2} at 300 K and 5.2×10^4 Nm^{-2} at 330 K. Calculate the heat of vapourization of benzene. (R = 8.314 J mole^{-1} K^{-1})

   ii) Calculate the osmotic pressure of 5% urea solution at 27°C (R = 0.082 lit /atm).

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

   i) Derive thermodynamically Van't Hoff reaction isotherm.

   ii) Describe the construction and working of the fractionating column.

   iii) What is mean by cryoscopic constant? Explain how the depression of freezing point of solvent may be used to determine the molecular weight of the dissolved substance.

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

   i) Calculate the amount of succinic acid extracted from one litre of aqueous solution containing 50 grams of acid on extracting with 200 CC of ether every time in five lots. If partition coefficient of acid in water to ether is 5.5.

   ii) Calculate the entropy change for the reversible expansion of 56 grams of nitrogen gas from 20 lit. to 40 lit, at constant temperature 30°C (At wt. of N = 14, R = 8.314 J).

Q4) a) Discuss the Arrhenius theory of electrolytes. What do you mean by abnormal molecular weights? Why are abnormal molecular weights observed? **[6]**

   OR

   Obtain the expression for entropy change of an ideal gas when its temperature and pressure are changed simultaneously.

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

   i) Discuss with the help of neat diagram the effect of temperature on the solubility of phenol in water.

   ii) Derive the thermodynamically the Nernst distribution law.

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P310   **[3717] - 507**

S.Y. B.Sc.

CHEMISTRY

CH - 212 : Organic Chemistry

(Sem. - I) (Old Syllabus) (21321)

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

Instructions to the candidates :

   1)   *All questions are compulsory.*

   2)   *Figures to the right indicate full marks.*

   3)   *Draw structures and diagrams if necessary.*

Q1) Answer the following :   [10]

   a)   Define the term 'Chiral centre'.

   b)   Benzaldehyde donot undergo Aldol condensation reaction. Why?

   c)   Write the 'Hinsburg test' for amines.

   d)   How will you prepare furan from 1, 4-diketone?

   e)   What is Hell-Volhard zelinsky reaction?

   f)   Draw the structure of cellobiose.

   g)   Give the specific use of Zn-Hg/HCl reagent.

   h)   Phenols are weakly acidic in nature. Why?

   i)   Give the structure of LS-Serine.

   j)   What is 'Biochemistry'?

Q2) a)   Assign the structures to 'A' & 'B' in the following reactions (any three) :

                                                                                                          [6]

       i) $CH_3 - C \equiv C - CH_3 \xrightarrow{Na/NH_3} \overline{A}. \xrightarrow{H_2/pt} B.$

       ii) $CH_3 - \underset{\underset{OH}{|}}{CH} - CH_3 \xrightarrow[H_2SO_4]{K_2Cr_2O_7} A \xrightarrow{NH_2OH} B.$

iii) $\underset{AlCl_3}{\overset{CH_3COCl}{\longrightarrow}}$ A $\overset{LiAlH_4}{\longrightarrow}$ B.

iv) $CH_3 - CH_2 - OH \overset{PCl_5}{\longrightarrow}$ A $\underset{ii) H_2/Ni}{\overset{i) KCN}{\longrightarrow}}$ B.

v) $\underset{\Delta}{\overset{(CH_3CO)_2O}{\longrightarrow}}$ A $\overset{HNO_3/H_2SO_4}{\longrightarrow}$ B

(with NH$_2$ substituted benzene ring)
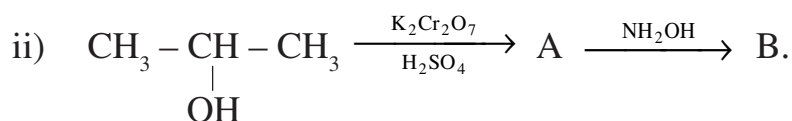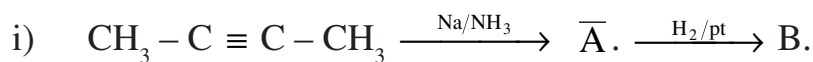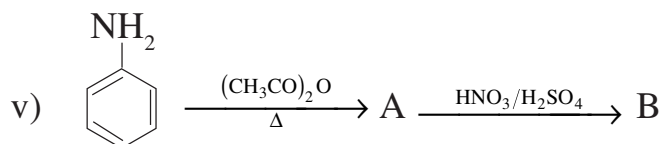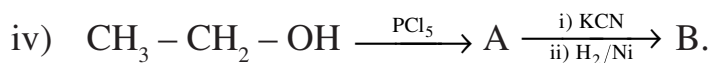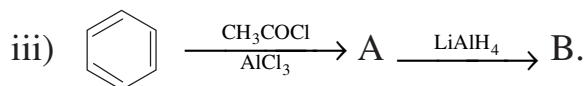
b) How will you bring about following conversions. (any two) **[4]**

i) Benzene into phenol.

ii) Methyl iodide into ethyl amine.

iii) Nitrobenzene to benzoic acid.

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

a) What are monosaccharides? Give any two objection for free-CHO group in Glucose. Explain the reaction of following with D-Glucose.

i) H_2/pt

ii) dil HNO_3.

b) What are proteins? Explain primary and secondary structure of proteins. Discuss the importance of H-bonding in protein structure.

c) Give the synthesis of thiophene from 1, 4 diketone. What is the action of following on pyrrole.

i) SO_3 / Pyridine.

ii) H_2 / Ni

iii) Aryl diazonium chloride.

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

i) What are enzymes? Discuss the classification of enzymes with suitable examples.

ii) Explain Cannizzaro's and cross cannizzaro's reaction with suitable examples.

iii) How many optical isomers are possible for following molecule? Assign 'R' and 'S' configuration to the chiral centre.

$$\begin{array}{c} CH_3 \\ HO \rule[0.5ex]{1.5em}{0.4pt}\!\!\!\!\!\!\rule{0.4pt}{2em}\rule[0.5ex]{1.5em}{0.4pt} H \\ \\ Br \rule[0.5ex]{1.5em}{0.4pt}\!\!\!\!\!\!\rule{0.4pt}{2em}\rule[0.5ex]{1.5em}{0.4pt} H \\ CH_3 \end{array}$$
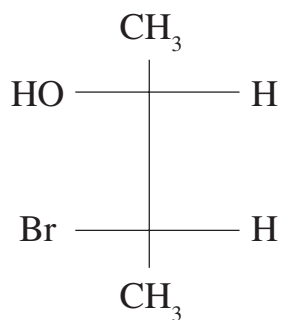
b) What are amides? How will you prepare acetamide from **[4]**

i) acetic acid.

ii) acetyl chloride.

OR

b) Discuss the factors affecting the stability of conformations with suitable examples.

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P311 **[3717] - 508**

S.Y. B.Sc.

BOTANY

BO - 211 : Taxonomy of Angiosperms

(Paper - I) (Sem. - I) (Old Course) (21411)

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

Instructions to the candidates :

   1)   *All questions are compulsory.*

   2)   *Figures to the right indicate full marks.*

   3)   *Draw neat labelled diagrams wherever necessary.*

Q1) Attempt the following : **[10]**

   a)   Give the name of any one Flora.

   b)   Mention any two advantages binomial nomenclature.

   c)   Who has given natural system of classification?

   d)   Give an example of family Euphorbiaceae.

   e)   Mention any two input devices of computer.

   f)   What is herbarium?

   g)   Mention any two major botanical gardens.

   h)   Give the name of family with aggregate fruit.

   i)   Name any two botanical journals.

   j)   Mention any two objectives of Taxonomy.

Q2) Answer any two of the following : **[10]**

   a)   Give merits and demerits of Bentham & Hooker's system of classification.

   b)   Mention criterion used for selection of plants for herbarium.

   c)   Give diagnostic characters of family Apocynaceae.

Q3) Write notes on : (Any two) **[10]**

    a)   Principles of ICBN.

    b)   Cyathium Inflorescence.

    c)   RAM and ROM.

Q4) Write distinguishing characters, floral formula and floral diagram of family Solanaceae and Caesalpinaceae. **[10]**

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

What is Botanical Garden? Describe salient features of Indian Botanical Garden Kolkatta.

<div align="center">✦ ✦ ✦ ✦</div>

P312　　　　　　**[3717] - 509**

S.Y. B.Sc.

BOTANY

BO - 212 : Plant Ecology and Utilization of Plants (21421)

(Paper - II) (Sem. - I) (Old Syllabus)

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

Instructions to the candidates :

　　1)　***All questions are compulsory.***

　　2)　***Figures to the right indicate full marks.***

　　3)　***Draw neat labelled diagrams wherever necessary.***

Q1) Attempt the following :　　　　　　　　　　　　　　**[10]**

　　a)　Give the botanical name of cotton.

　　b)　Define autoecology.

　　c)　Define homeostasis.

　　d)　Give any two uses of rubber.

　　e)　Enlist abiotic componants of ecosystem.

　　f)　Give any two uses of essential oils.

　　g)　Give any two properties of coir.

　　h)　Give the botanical name of chickpea.

　　i)　Give the center of origin of wheat.

　　j)　What are ecological indicators?

Q2) Answer any two of the following :　　　　　　　　　　　　**[10]**

　　a)　Describe anatomical adaptations in hydrophytes.

　　b)　Give botanical names, properties and uses of neem wood.

　　c)　Give botanical names, part used and uses of potato.

Q3) Write short notes on : (Any two)   **[10]**

    a)   Plants as indicators of attitude and nature of soil.

    b)   Energy flow in ecosystem.

    c)   Give botanical source, properties and uses of groundnut oil.

Q4) What is nitrogen cycle? Describe in detail nitrogen cycle and its importance.
[10]

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

What are halophytes? Describe an external and internal peculiarities of halophytes with suitable examples.

<div align="center">✦ ✦ ✦ ✦</div>

P323   **[3717] - 520**
S.Y. B.Sc.
PSYCHOLOGY
Experimental Psychology (Paper-I)
(Old Course) (Sem.-I)

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

   1)   *Attempt all questions.*

   2)   *Draw the figures and diagrams wherever necessary.*

   3)   *Figures to the right indicate full marks.*

Q1) Answer in two or four sentences.   **[16]**

   a)   What is psychophysics?

   b)   What is cutaneous sensation?

   c)   What does punctuate sensitivity implies?

   d)   What is perception?

   e)   What is size Constancy?

   f)   Enlist the monocular determinents of perceived distance.

   g)   Define emotion.

   h)   What is the sense of modality?

Q2) Attempt <u>any two</u> of the following in eight or ten sentences.   **[8]**

   a)   Explain the types of Chemical Senses.

   b)   Explain the division of attention.

   c)   Discuss the types of movement perception.

Q3) Write Short notes on <u>any two</u> of the following. **[8]**

    a)   Binocular determinents of perceived distance.

    b)   Role of ANS in emotion.

    c)   Verbal learning.

Q4) Explain in detail the important measures of physiological changes in emotion. **[8]**

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

Discuss the internal determinents of attention.

<div align="center">□□□□</div>

P324   **[3717] - 521**

S.Y. B.Sc.
PSYCHOLOGY
Psychology of Organizational Behaviour
(Paper - II) (Old Course) (Sem. - I)

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

Instructions to the Candidates:

  1)   ***Attempt all questions.***

  2)   ***Draw the figures and diagrams wherever necessary.***

  3)   ***Figures to the right indicate full marks.***

Q1) Answer in two or four sentences.   **[16]**

  a)   What is organizational behaviour?

  b)   What is organizational goal?

  c)   State the job related factors of Job satisfaction.

  d)   Who proposed the Tri-dimensional theory of job satisfaction?

  e)   What is management skill?

  f)   Differentiate material goal and human goal.

  g)   Who proposed need hierarchy theory?

  h)   State the methods of job satisfaction.

Q2) Attempt <u>any two</u> of the following in eight to ten sentences.   **[8]**

  a)   Explain the characteristics of organizational behaviour.

  b)   Explain the personal factors in job satisfaction.

  c)   Discuss the key elements of organizational behaviour.

Q3) Write Short notes on any two of the following.   **[8]**

   a)   Nature of man.

   b)   Job satisfaction.

   c)   Internal versus external motives.

Q4) What is motivation? Explain the characteristics of high achievers?   **[8]**

                                   OR

Explain the determinents of organizational behaviour.

                                  *****

P325   **[3717] - 522**

S.Y. B.Sc.

STATISTICAL TECHNIQUES

STT - 211 : Statistical Techniques - I

(Sem. - I) (Old Course) (Paper - I)

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

Instructions to the candidates :

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

Q1) Attempt each of the following :

   a)   Choose the correct alternative in each of the following :   **[1 Each]**

      i)   If $X \rightarrow P(5)$, then mode of X is

         A) 4   B) 5   C) 4 and 5   D) 5 and 6

      ii) For exponential distribution with mean 3, third quartile Q_3 is

         A) $3\log_e\left(\dfrac{4}{3}\right)$ B) $3\log_e 4$

         C) $\dfrac{1}{3}\log_e 4$ D) $\dfrac{1}{3}\log_e\left(\dfrac{4}{3}\right)$

      iii) If p.m.f of random variable X is

$$P(X = x) = \frac{1}{3}\left(\frac{2}{3}\right)^x ; \; x = 0, 1, 2, \text{.......} \text{ then } E(X) \text{ is}$$

         A) 2   B) 3   C) 4   D) 6

   b)   State whether each of the following statements is true or false : **[1 Each]**

      i)   For Poisson distribution mean and variance are equal.

      ii) If $X \rightarrow NB(k_1, p)$ and $Y \rightarrow NB(k_2, p)$ then $(X + Y) \rightarrow NB(k_1 + k_2, p)$ always.

      iii) Normal distribution is symmetric about its mean.

c) State lack of memory property of exponential distribution. **[1]**

d) If X $\rightarrow$ NB (k, p) such that E(X) = 12 and Var(X) = 36 then find the values of k and p. **[1]**

e) State the conditions under which binomial distribution can be approximated by Poisson distribution. **[1]**

f) If X and Y are i.i.d. N(1, 1) variates, then state the distribution of Z = 2X + Y – 2 **[1]**

Q2) Attempt any <u>two</u> of the following : **[5 Each]**

a) i) Define Poisson distribution with parameter m. State its additive property.

ii) Let X $\rightarrow$ P(m) such that $P(X = 5) = \dfrac{3}{10} . P(X = 4)$ find P[X $\leq$ 1].

b) A continuous random variable X has the following p.d.f.

$$f(x) = \begin{cases} \dfrac{1}{2\sqrt{2\pi}} e^{-\frac{1}{8}(x^2 - 6x + 9)} & ; \quad -\infty < x < \infty \\ 0 & ; \quad \text{o.w.} \end{cases}$$

i) Identify mean and variance of X.

ii) Find $P[|X + 3| \leq 1]$.

c) A person fires shots at a target until he hits the target. The probability that a shot hits the target in an attempt is 0.7. Assuming independence of attempts, find the probability that he hits the target for the first time

i) On fourth attempt

ii) On or before third attempt.

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

a) i) Define an exponential distribution with mean θ. State its distribution function.

ii) Suppose that the life-time of a TV tube is exponentially distributed with mean 2000 hours. Find the probability that the tube will survive between 2200 to 2400 hours.

b) In the inspection of tinplates undergoing continuous electrolytic process, 12 imperfections are spotted every hour on an average. Find the probability of spotting.

   i) No imperfection during given 5 minutes interval.

   ii) At most 2 imperfections during given 15 minutes interval.

c) An unbiased die is rolled 720 times. Using the normal approximation, find the probability that

   i) More than 128 sixes will turn up.

   ii) The number of sixes will be between 100 and 140.

Q4) Attempt any <u>one</u> of the following :

   a) i) Define negative binomial distribution with parameters k and p. State the recurrence relation for its probabilities. State its relation with geometric distribution. Give one real life situation where it is applied. **[4]**

   ii) The weights of students in a certain college are normally distributed. If 44% of the students have their weights less than 55 kgs and 6% of the students have their weights above 80 kgs, find the mean and variance of the distribution. **[6]**

   b) i) Define normal distribution with parameters μ and σ^2. State its median and mode. **[2]**

   ii) If the probability that a couple will have a male child is 0.5, find the probability that their fourth child is the second son. **[3]**

   iii) A manufacturer keeps a large number of screws in a drawer. 60% of these screws are of type L, 30% are of type M and remaining are of type S. If 10 screws are chosen at random, find the probability that there are exactly five of type L, three of type M and two of type S. **[5]**

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P328   **[3717] - 525**

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL-212 : Communication Systems -I

(Paper - I) (Old Course) (Sem. - I)

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

Instructions to the Candidates:

   1)   *All questions are compulsory.*

   2)   *Draw neat diagrams wherever necessary.*

   3)   *Figures to the right indicate full marks.*

   4)   *Use of Non-Programmable Calculator is allowed.*

Q1) Attempt all of the following

   a)   Define noise figure.   **[1]**

   b)   What is internal noise? Give its types.   **[1]**

   c)   What is meant by demodulation?   **[1]**

   d)   What is sensitivity of radio receiver?   **[1]**

   e)   An AM radio broadcast receiver operates at frequency of 550 kHz, Find the local oscillator frequency and image frequency.   **[2]**

   f)   If maximum amplitude of carrier wave is 5 volt and minimum amplitude is 4 volt, find the modulation index of amplitude modulated output. **[2]**

   g)   "Walky-talky is a half duplex two way radio communication," comment.   **[2]**

   h)   Partition noise makes a transistor 'noisy' - comment   **[2]**

Q2) Attempt <u>any two </u>of the following.

   a)   Draw the block diagram of communication system. Explain the role of each block.   **[4]**

   b)   Explain what do you mean by amplitude modulation? Derive an expression for instantaneous voltage of modulated signal.   **[4]**

   c)   With neat diagram explain composite video signal   **[4]**

Q3) Attempt <u>any two</u> of the following:

a) What is an antenna? List various parameters of antenna. Explain any one parameter in brief. **[4]**

b) What is CCTV? State its applications. **[4]**

c) Compare TRF receiver with crystal receiver **[4]**

Q4) Attempt the following

a) Explain the concept of synchronization and scanning in Television with proper waveforms. **[6]**

b) Draw block diagram of T.V. transmitter and explain the function of each block. **[6]**

OR

a) If a FM wave is represented by the equation $e = 10 \sin (8 \times 10^8 \, t + 4 \sin 1500 \, t)$. Calculate the carrier frequency, modulating frequency, m_f and maximum δ. What power will this FM wave will dissipate in a $8 \, \Omega$ resistor? **[4]**

b) In a superheterodyne receiver if Q = 80, IF = 455 kHz and f_s=950 kHz Calculate image frequency and image frequency rejection. **[4]**

c) A carrier wave with amplitude 10V and frequency 5 MHz is amplitude modulated to 70% level with modulating frequency 1 kHz . Calculate amplitude of sideband and the bandwidth. **[4]**

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P329   **[3717] - 529**
                              S.Y. B.Sc.
                      ENVIRONMENTAL SCIENCE
        Environment & Effect of Human Activities on environment
                (Paper - I) (Old Syllabus) (Sem. - I)

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

Instructions to the candidates:
    1)   *All questions are compulsory.*
    2)   *Draw neat and labelled diagrams wherever necessary.*
    3)   *Figures to the right indicate full marks.*

Q1) Attempt the following in 1-2 lines each   **[10]**

    a)   Enlist the components of abiotic environment.

    b)   Define climate.

    c)   What are air currents?

    d)   Define the term community

    e)   What are Biogeochemical cycles?

    f)   Give the types of migration.

    g)   What is parasitism.

    h)   Define the term Biomagnification.

    i)   What is Deammonification?

    j)   What is liebig's low of minimum?

Q2) Write short notes on <u>Any Two</u> of the following each in 8-10 lines :   **[10]**

    a)   Write a note on Bhopal Gas Tragedy.

    b)   Describe any four characteristics of population growth.

    c)   Write a note on Interspecific relationship with examples.

Q3) Answer <u>Any Two</u> of the following each in 8-10 lines :- [10]

    a)   Write a note on Elnino effect.

    b)   Describe in detail oxygen cycle with diagram.

    c)   Write a note on Demographic Transition.

Q4) Answer <u>Any One</u> of the following each in <u>20-22</u> lines : [10]

    a)   Describe in detail climate of India.

    b)   Discuss in detail any 4 limiting factors.

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P330 **[3717] - 530**

S.Y. B.Sc.
ENVIRONMENTAL SCIENCE

Effect of Changed Environment on Man & Management of Environment
(Paper - II) (Old Syllabus) (Sem. - I)

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

Instructions to the Candidates:

1) *All questions are compulsory.*
2) *Draw neat and labelled diagrams wherever necessary.*
3) *Figures to the right indicate full marks.*

Q1) Answer the Following in 1-2 lines each : **[10]**

    a) Define slicosis.

    b) Write any two water borne diseases.

    c) What is sewage?

    d) Define infectious wastes.

    e) Define pneumoconiasis.

    f) Define water pollution.

    g) What is industrial waste?

    h) Write any two occupational diseases.

    i) Define solid waste.

    j) Define lethal dose.

Q2) Write short notes on <u>any two</u> of the following each in 8-10 lines : **[10]**

    a) Methods of waste minimization.

    b) Floods & its management.

    c) Need of developmental projects.

Q3) Write <u>any two</u> of the following each in 8-10 lines : [10]

    a)   Discuss rehabilitation problem due to development activity.

    b)   Write different methods of waste management.

    c)   Explain slums formation & their associated problems.

Q4) Answer <u>any one</u> of the following in <u>20-22</u> lines : [10]

    a)   Write the Effects of chemical hazards with suitable case study.

    b)   Discuss in detail the changes in environmental patterns due to developmental activities. Give suitable examples.

□□□□

[3717] - 504
S.Y. B.Sc.
PHYSICS
PH - 211 : Mathematical Physics
(Paper - I) (Sem. - I) (Old) (21211)

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

Instructions to the candidates:

     1)   *All questions are compulsory.*

     2)   *Figures to the right indicate full marks.*

     3)   *Use of calculators and log-tables is allowed.*

     4)   *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt <u>all</u> of the following :

     a)   Express complex number πi into polar form and exponential form. **[1]**

     b)   Show that the equation
          $dF = (y^2 - y + 2xy)\, dx + (x^2 - x + 2xy)\, dy$ is an exact differential.**[1]**

     c)   What do you mean by a solenoidal vector field? Give one example. **[1]**

     d)   Show that $\cosh\theta = \cos(i\theta)$.   **[1]**

     e)   When the point $X = X_0$ is said to be singular point of the given differential equation.   **[1]**

     f)   Define flow chart and give its two advantages.   **[1]**

     g)   If $\phi = 3x^2y - y^2z^2$, find $\vec{\nabla}\phi$.   **[1]**

     h)   If $z = 1 + \sqrt{3}\, i$, determine (i) |z| and (ii) Arg (z).   **[1]**

     i)   If $f(x, y) = 4\dfrac{x}{y}$, then show that $x\dfrac{\partial f}{\partial x} + y\dfrac{\partial f}{\partial y} = 0$.   **[1]**

     j)   Explain the terms used in differential equation :   **[1]**
          i)   Linearity.
          ii)   homogeneity.

Q2) Attempt <u>any two</u> of the following :

a) Find the slope of the tangent to the curve $x^3 + xy + y^2 - 4 = 0$ at $x = 2$ and $y = -2$. **[5]**

b) If $\vec{F} = \vec{\nabla}\phi$, show that the work done in moving a particle in the force field $\vec{F}$ from A (x_1, y_1, z_1) to B (x_2, y_2, z_2) is independent of the path joining the two points. **[5]**

c) What is Argand diagram? Explain subtraction of two complex numbers by using Argand diagram. **[5]**

Q3) Attempt <u>any two</u> of the following :

a) Write algorithm and draw flow chart for the third kinematical equation $v^2 = u^2 + 2as$. **[5]**

b) Show that the point $x = 0$ is non-essential singularity of the differential equation
$$2x^2 \, y'' - xy' + (x - 5) \, y = 0.$$ **[5]**

c) Interpret the following equation geometrically.
$$|z + 3| = z \, |z - 3|$$
where $z = x + iy$. **[5]**

Q4) Attempt <u>any one</u> of the following :

a) i) Obtain unit vectors $\hat{e}_r$ and $\hat{e}_\theta$ for plane polar coordinate system. Hence show that plane polar coordinate system is orthogonal. **[5]**

ii) Find a unit normal to the surface $x^2 + 3y^2 + 2z^2 = 6$ at point $(2,0,1)$. **[5]**

b) i) Show that $\vec{\nabla}\left(\dfrac{1}{r}\right) = \dfrac{-\vec{r}}{r^3}$. **[5]**

ii) Find the possible percentage error in computing the parallel resistance r of three resistances r_1, r_2, r_3 from formula
$$\frac{1}{r} = \frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3}, \text{ if } r_1, r_2, r_3 \text{ are each in error by 1.2\%.} \quad \textbf{[5]}$$

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[3717] - 505
S.Y. B.Sc.
PHYSICS
PH - 212: Electricity and Magnetism
(Paper - II) (Sem. - I) (Old Course)

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

Instructions to the candidates:

    1)　All questions are compulsory.

    2)　Figures to the right indicate full marks.

    3)　Use of calculator and log table is allowed.

    4)　Neat diagrams must be drawn wherever necessary.

Q1) Attempt <u>all</u> of the following :

    a)　State principle of superposition.　　　　　　　　　　**[1]**

    b)　State Gauss's law in electrostatics.　　　　　　　　　**[1]**

    c)　Define volume charge density.　　　　　　　　　　　**[1]**

    d)　Explain polar molecule with one example.　　　　　　**[1]**

    e)　A capacitance of capacitor is 2×10^{-10} Farad and it has been charged to 100 volts. Find the charge on the capacitor.　**[1]**

    f)　Define current density. Give its SI unit.　　　　　　　**[1]**

    g)　State maximum power transfer theorem.　　　　　　**[1]**

    h)　What resistance must be connected in series with 10 mH inductance, so that the circuit has time constant of 2.5×10^{-3} sec?　**[1]**

    i)　State Ampere's circuital law.　　　　　　　　　　　**[1]**

    j)　Define self inductance. Give its SI unit.　　　　　　　**[1]**

Q2) Attempt <u>any two</u> of the following :

    a)　Obtain an expression for electric potential at a point due to a point charge at a distance r from it.　**[5]**

    b)　Using Biot-savart's law, obtain an expression for magnetic induction at a point near the long straight current carrying wire.　**[5]**

    c)　Discuss the phenomenon of resonance in LCR series circuit. Obtain the expression for resonant frequency.　**[5]**

Q3) Attempt <u>any two</u> of the following :

a) A parallel plate capacitor has surface charge density of 10^{-8} C/m² on it. The area of each plate is 100 cm² and distance between the plates is 1 cm. A glass slab of the same shape as that of the capacitor plates having dielectric constant 5 is kept midway between the plates. Find the three electric vectors in glass slab. **[5]**

b) A coil of 20 cm radius has 100 turns and carries a current of 3 ampere. Find the magnetic induction at the centre of the coil.
(Given : $\mu_0 = 4\pi \times 10^{-7}$ wb/A–m). **[5]**

c) A condenser of a capacity 5 µF is first charged and then discharged through a resistance of 200 kΩ. Find the time in which the potential will fall to half of it's original value. **[5]**

Q4) a) Attempt (i) or (ii) of the following :

i) 1) Show that in the presence of dielectric the induced charge q' due to polarisation is always less than the free charge q and is given by

$$q' = q\left(1 - \frac{1}{k}\right).$$ **[4]**

2) Show that the current density $\overline{J}$ and electric intensity $\overline{E}$ are related as $\overline{J} = \sigma \overline{E}$. **[4]**

ii) 1) Explain the different types of power losses in transformer. **[4]**

2) Using Ampere's circuital law, obtain magnetic induction inside the toroid. **[4]**

b) Attempt <u>any one</u> of the following :

1) Explain the concept of electric potential. **[2]**

2) State and explain Joule's law in electricity. **[2]**

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P313

[3717]-510

S.Y. B.Sc.

ZOOLOGY

ZO - 211: Animal Systematics & Diversity

(Semester - I) (Paper - I)

(Old Course)

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

Instructions to the candidates:-

   1)   *All questions are compulsory.*

   2)   *Figures to the right indicate full marks.*

   3)   *Neat-labelled diagrams must be drawn wherever necessary.*

Q1) Attempt the following :   **[10]**

   a)   Write the biological name of Star fish.

   b)   Give any two examples of platy helminthes.

   c)   What is the function of dermal branchiae?

   d)   Enlist any two haemocytes of cockroach.

   e)   Write any two functions of pyloric caecne of star fish.

   f)   Give the names of endocrine glands in cockroach.

   g)   What do you mean by autotomy?

   h)   Give the function of cockroach gizzard.

   i)   What do you mean by mosaic image?

   j)   Enlist any two functions of integument of cockroach.

Q2) Write short notes on (<u>Any Two</u>) :   **[10]**

   a)   Sexual dimorphism in cockroach.

   b)   Labium of cockroach.

   c)   Bipinnaria larva of star fish.

Q3) Attempt the following (Any Two) :   **[10]**

    a)   Describe siphoning type of mouth parts.

    b)   Write any five characters of Aschelminthes.

    c)   Explain crossed/scizzors type pedicellariae.

Q4) Describe water vascular system of starfish. Write a note on its function.**[10]**

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

Describe the female reproductive system of cockroach. Add a note on ootheca.

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

P314 **[3717]-511**

S.Y. B.Sc.
ZOOLOGY
ZO - 212 : Applied Zoology
(Fisheries & Poultry)
(Sem - I) (Paper - II) (Old Course)

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

Instructions to the candidates:-
  1) *All questions are compulsory.*
  2) *Figures to the right indicate full marks.*
  3) *Neat labelled diagrams must be drawn wherever necessary.*

Q1) Attempt the following : [10]

  a) Define Sericulture.

  b) Write biological name of Indian mackerel.

  c) Mention the use of Ising glass.

  d) Give the use of dol net.

  e) What is mantle.

  f) What do you mean by gears?

  g) Define sexing chicks.

  h) What is feed additive?

  i) Enlist any two characters of Rhode Island Red.

  j) Define chilling

Q2) Write short notes on (<u>Any Two</u>) : [10]

  a) Salting.

  b) Flat type incubator.

  c) Harvesting method of <u>Horpodon.</u>

Q3) Attempt the following (Any Two) :   **[10]**

    a)   Write a note on Dinghi.

    b)   Describe the characters of Assel breed.

    c)   Give the cultural methods of Labeo.

Q4) Give an account of various types of fishery byproducts.   **[10]**

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

What is brooding? Describe in detail different types of brooding.

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

[3717] - 512
S.Y. B.Sc.
GEOLOGY
GL - 211 : Mineralogy
(Sem. - I) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following in two or three lines :

[10]

a) Define 'uniaxial mineral'.

b) State the causes of twinning in crystals.

c) What are 'hooper crystals'?

d) Give the three basic attributes of a gemstone.

e) What is meant by 'retardation'?

f) Define 'isotropism'.

g) What is meant by 'double refraction colours'?

h) Give the chemical composition of Wollastonite.

i) Name the type of twin shown by Rutile.

j) Name any two gem varieties of garnet.

Q2) Explain the following (any two) :

[10]

a) Shadow method for determining R.I. of a mineral.

b) Sign of elongation of minerals.

c) Inosilicate structure with examples.

Q3) Write notes on (any two) :   **[10]**

    a)   Growth of crystals in cavities.

    b)   Extinction positions in minerals.

    c)   Alteration products of Felspars.

Q4) Describe the silicate structure, chemical, composition, physical & optical properties and paragenesis of <u>Clay</u> group of minerals.   **[10]**

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

Describe the silicate structure, chemical, composition, physical & optical properties and paragenesis of <u>Chlorite</u> group of minerals.

<div align="center">✪✫✪✫</div>

[3717] - 513
S.Y. B.Sc.
GEOLOGY
GL - 212 : Structural Geology
(Sem. - I) (Old Course)

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

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Figures to the right indicate full marks.

    3)   Neat diagrams must be drawn wherever necessary.

Q1) Answer the following questions in two or three lines :   **[10]**

    a)   Define plunge of a linear feature.

    b)   Define the term 'Tension'.

    c)   What are culmination?

    d)   Define fan fold.

    e)   Define the term 'slip' along a fault.

    f)   Give an example of a rock showing sheeting.

    g)   Define 'Diastem'.

    h)   What are strike joints.

    i)   Define Isoclinal fold.

    j)   Define overthrust fault.

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

    a)   Determination of top of bed with help of ripple marks.

    b)   Plunging fold and non plunging fold.

    c)   Recognition of fault in the field.

Q3) Explain the following (any two) :   [10]

    a)   Formation of outlier and inlier.

    b)   Columnar joints.

    c)   Parts of a fold.

Q4) Define unconformity. Describe the following with suitable example :
    a)   Discontinuity.
    b)   Non-conformity.   [10]

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

What are faults. Describe with suitable examples the effect of faulting on disrupted strata.

<div align="center">✪✫✪✫</div>

[3717] - 514
S.Y. B.Sc.
STATISTICS
ST - 211 : Discrete Probability Distributions and Time Series
(Sem. - I) (Old Course)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

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

    4)   *Symbols and abbreviations have their usual meaning.*

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

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

        i)   If X is a discrete random variable (r.v.) taking non-zero values then harmonic mean is given by

        A) $E(X)$ B) $E\left(\dfrac{1}{X}\right)$ C) $\dfrac{1}{E\left(\dfrac{1}{X}\right)}$ D) $E(\log X)$.

        ii)   If X and Y are two independent Poisson r.vs. with means 1 and 2 respectively then the variance of $3X + Y$ is

        A)   3   B)   5   C)   7   D)   11

        iii)   In a time series "an increase in employment during harvest time" is due to

        A)   Cyclical component   B)   Seasonal component

        C)   Irregular component   D)   Trend component

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

        i)   The distribution function of a discrete r.v. X is an increasing function of X.

        ii)   For a geometric distribution with parameter p, variance is greater than mean.

        iii)   In the additive model of time series, four components are independent.

c) State one real life situation where negative binomial distribution is applicable. **[1]**

d) State the additive property of cumulant generating function (c.g.f.) of two discrete r. vs. **[1]**

e) Verify whether the following function is probability mass function (p.m.f.)

$$P(X) = \frac{e^{-1}}{x!}, \; x = 0,1,2,.....$$ **[1]**

$$= 0 \; , \qquad \text{otherwise}$$

f) State the conditions under which binomial distribution tends to Poisson distribution. **[1]**

Q2) Attempt <u>any two</u> of the following : **[5 each]**

a) The joint probability distribution of r.v. (X,Y) is

$$P(x, y) = \frac{e^{-2m} \, m^{x+y}}{x! \, y!}, \qquad x = 0,1,2,.......$$

$$y = 0,1,2,.......$$
$$0 < p < 1, \; q = 1 - p$$
$$= 0 \qquad , \qquad \text{otherwise}$$

Find : i) The marginal distribution of Y.

ii) The conditional mean of X given Y = y.

b) Let X and Y be independent Poisson r. vs. with parameters m_1 and m_2 respectively.

i) Find the distribution of X+ Y.

ii) Does X – Y follow Poisson distribution? Justify.

c) What is time series? State the different components of time series. Further explain any one component with illustration.

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

a) Define p. m. f. and distribution function of a discrete r.v. X taking countably infinite values. State any three properties of distribution function.

b) Let X and Y be independent and identically distributed geometric r. vs. with p. m. f

$$P(x) = pq^x \quad , \quad x = 0,1,2,.......$$
$$0 < p < 1; \; q = 1 - p$$
$$= 0 \quad , \quad \text{otherwise}$$

Find the conditional distribution of X given X + Y = n, where 'n' is positive integer.

c) If X and Y are independent Poisson variates with $V(X + Y) = 3$ and

$$P(X = 2/X + Y = 4) = \frac{8}{27}, \text{ find } E(Y).$$

Q4) Attempt <u>any one</u> of the following :

a) i) Describe ratio to moving average method for computing seasonal indices. **[5]**

ii) If moment generating function (m. g. f.) of a r. v. X is

$$\left(\frac{1}{5} + \frac{4}{5}e^t\right)^5 \text{ then find mean and variance of X.} \quad \textbf{[5]}$$

b) i) Obtain the factorial m. g. f. of NB(k, p) distribution. Hence, find mean and variance of the distribution. **[6]**

ii) The probability that a family prefers tea of brand A is 0.3. Find the probability that the tenth family in a survey is found to be fifth one, who prefer tea of brand A. **[4]**

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[3717] - 515

S.Y. B.Sc.

STATISTICS

ST - 212 : Continuous Probability Distributions - I

(Paper - II) (Sem. - I) (Old Course)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

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

    4)   *Symbols and abbreviations have their usual meaning.*

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

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

        i)   If X is a continuous random variable (r.v.) then $P(a \leq X \leq b)$ is :

            A) $F(a) - F(b)$ B) $F(b) - F(a)$

            C) $1 - F(a) + F(b)$ D) $1 - F(a) - F(b)$.

        ii)   If X follows exponential distribution with mean θ then third quartile is equal to

            A) $\theta log_e(4)$ B) $\theta log_e\left(\dfrac{1}{4}\right)$

            C) $\dfrac{1}{\theta} log_e\left(\dfrac{1}{4}\right)$ D) $\dfrac{1}{\theta} log_e(4)$.

        iii) If $X \sim G\ (\alpha = 5, \lambda = 2)$ then Var (X) is :

            A)   0.08   B)   2.5

            C)   0.4   D)   1.25.

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

        i)   If X and Y are two r.v.s. then

            $E\ (XY) = E(X) \cdot E(Y)$ always.

        ii)   If X and Y are two independent r.v.s. then

            $M_{x+y}\ (t) = M_x(t) \cdot M_Y(t)$.

iii) For normal distribution all odd order central moments are equal to zero.

c) Let X be a continuous r.v. with p. d. f. **[1]**

$$f(x) = \begin{cases} ke^{-\alpha x} & , x \geq 0, \quad \alpha > 0 \\ 0, & \text{otherwise.} \end{cases}$$

Find the value of k.

d) Define independence of two r.v.s of continuous type. **[1]**

e) If a r.v. X has mgf $M_x(t) = e^{3t + 4t^2}$, state mgf of 3X. **[1]**

f) Define a continuous r.v. with an illustration. **[1]**

Q2) Attempt <u>any two</u> of the following : **[5 each]**

a) State and prove additive property of normal distribution.

b) If X is a continuous r.v. with distribution function

$$F(x) = \begin{cases} 0, & x < 5 \\ 1 - \dfrac{25}{x^2}, & x \geq 5 \end{cases}$$

Find
i) P (X > 10)
ii) P ($7 \leq X \leq 8 / X \geq 6$)
iii) p.d.f. of X.

c) The joint p.d.f. of two dimensional continuous r.v. (X, Y) is

$$f(x, y) = \begin{cases} 2, & 0 < x < y < 1 \\ 0, & \text{otherwise.} \end{cases}$$

Find
i) marginal p.d.f. of X.
ii) marginal p.d.f. of Y.
Also verify whether X and Y are independent r.v.s.

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

a) Let X ~ N (μ, σ^2). Find the m.g.f. of X. Hence, find mean and variance of X.

b) State and prove lack of memory property of exponential distribution with mean θ.

c) The marks scored by the students in a certain examination are normally distributed. If 6.68% of the students obtained 70 or more marks and 15.87% obtained less than 45 marks, find the parameters of the normal distribution.

Q4) Attempt <u>any one</u> of the following :

a) i) Define mode of a continuous r.v. and obtain mode of the r.v. **[4]** having p.d.f.

$$f(x) = \frac{x^2}{2} e^{-x}, \ x \geq 0.$$

ii) If X any Y are two independent variables following gamma distribution with parameters (α, λ_1) and (α, λ_2) respectively, show that

$$U = X + Y \text{ and } V = \frac{X}{X + Y} \text{ are also independent.}$$ **[6]**

b) i) Let (X, Y) be a continuous bivariate r.v. with joint p.d.f.

$$f(x, y) = \begin{cases} 4x(1-y), & 0 < x, y < 1 \\ 0, & \text{otherwise} \end{cases}$$

calculate $P\left(0 < X < \frac{1}{2}, Y < \frac{1}{3}\right)$ **[4]**

ii) If $X \sim G(\alpha, \lambda)$, find the distribution of cX, where c is a positive constant. **[3]**

iii) The lifetime of a certain kind of battery is an exponential r.v. with mean 200 hours. What is the probability that such a battery will last for at least 100 hours. **[3]**

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[3717] - 516

S.Y. B.Sc.

GEOGRAPHY - I

Gg - 211 : Fundamentals of Agricultural Geography
(Paper - I) (Sem. - I) (Old - 2005 Pattern)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

    3)   *Draw neat diagrams and sketches wherever necessary.*

    4)   *Use of map stencils is allowed.*

Q1) Answer the following questions in about two or three sentences each : **[10]**

    a)   Give definition of Agricultural Geography.

    b)   Name any two methods of irrigation.

    c)   Mention any one important characteristic of regur soil.

    d)   Name any two economic factors affecting agriculture.

    e)   Write only the active factors responsible for soil formation.

    f)   Where is the plantation agriculture practiced in India?

    g)   What are the traditional methods of agriculture?

    h)   What is maximum temperature?

    i)   Give any two salient features of subsistence agriculture.

    j)   What is land suitability?

Q2) Write short notes on <u>any two</u> of the following : **[10]**

    a)   Demerits of chemical fertilisers.

    b)   Deterministic approach in agricultural geography.

    c)   Difference between intensive and extensive farming.

Q3) Attempt <u>any two</u> of the following :   **[10]**

    a)   Give the scope of agricultural geography.

    b)   Describe the characteristics of the regur and the alluvial soils.

    c)   Explain the soil structure.

Q4) What is soil conservation? Explain various methods of soil conservation.**[10]**

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

Describe the different types of irrigation in detail.

<div align="center">✪✫✪✫</div>

[3717] - 517
S.Y. B.Sc.
GEOGRAPHY
Gg - 212 : Plant Geography
(Paper - II) (Sem. - I) (Old Pattern - 2005)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

    3)   *Draw neat diagrams and sketches wherever necessary.*

    4)   *Use of map stencil is allowed.*

Q1) Answer the following questions in two or three sentences each :   **[10]**

    a)   What do you mean by photoperiod?

    b)   Define the phytogeography.

    c)   Give two examples of monocots.

    d)   Write two characteristics of bryophytes.

    e)   Give two examples of plant species from temperate deciduous forest biomes.

    f)   Give two examples of phanerophytes.

    g)   What do you mean by megatherm?

    h)   Write two characteristics of mesophytes.

    i)   Write two names of states included in central Indian floristic region.

    j)   Give two examples of Tundra plant.

Q2) Write short notes on <u>any two</u> of the following :   **[10]**

    a)   Nitrogen cycle.

    b)   Xerophytes.

    c)   Phanerogams.

Q3) Answer <u>any two</u> of the following :   **[10]**

    a)   Write the importance of the study of plant Geography.

    b)   Describe the North temperate phytogeographic region.

    c)   Describe the role of vegetation in the soil formation.

Q4) Explain in detail the climatic factors influencing plant growth.   **[10]**

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

Explain the various uses of plants.

<div align="center">✪✿✪✡</div>

[3717] - 518
S.Y. B.Sc.
MICROBIOLOGY
MB - 211 : Growth, Physiology and Systematics of Bacteria
(Paper - I) (Sem. - I) (Old Course)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

    3)   *Draw neat labelled diagrams wherever necessary.*

Q1) Attempt the following (All questions are compulsory) :   **[10]**

    a)   Match the following :

i)	Continuous culture	a)	Absolute specificity
ii)	Extracellular enzyme	b)	$\dfrac{0.693}{k}$
iii)	Chemical method of estimation of growth	c)	Turbidostat
iv)	Generation time in hrs.	d)	Amylase
v)	Lock & key model	e)	Microkjeldahl's method.

    b)   What is diauxy?

    c)   Enzymes are composed of carbohydrate molecules. True / False?

    d)   Transaminase belongs to _____

        i)   Lyases   ii)   Oxidoreductases

        iii)   Transferases   iv)   Ligases.

    e)   Define D-value.

    f)   Which of the following is a direct method of enumeration.

        i)   Biomass estimation   ii)   Turbidity measurement

        iii)   PCV determination   iv)   DMC.

Q2) Attempt any two :   **[10]**

   a)   Define growth. Describe different phases of bacterial growth in detail.

   b)   Describe the effect of temperature on enzyme activity.

   c)   No. of organisms / ml in the given curd sample are as follows.
        75, 76, 96, 94, 95, & 80
        find mean & variance.

Q3) Attempt <u>any two</u> :   **[10]**

   a)   Describe standard plate count methods for enumeration of bacteria.

   b)   Describe different properties of enzymes.

   c)   Draw histogram for the following data.

Age Group	No. of persons infected by H_1N_1
05 - 15	130
15 - 25	150
25 - 35	125
35 - 45	80
45 - 55	100
55 - 65	110
65 - 75	140

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

   a)   Explain classification of enzymes as per IUB. Describe the class
        Transferases in detail with two examples.

   b)   What is synchronous culture? Enlist methods used to obtain synchronous
        culture & describe any one in detail.

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P322

[3717] - 519
S.Y. B.Sc.
MICROBIOLOGY
MB - 212 : Bacterial Genetics & Applied Microbiology
(Paper - II) (Sem. - I) (Old Course)

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

Instructions to the candidates:

     1)   *All questions are compulsory.*

     2)   *Figures to the right indicate full marks.*

     3)   *Draw neat labelled diagrams.*

Q1) Attempt the following (All subquestions are compulsory) :   **[10]**

     a)   Draw the structure of Guanine.

     b)   Define continuous fermentation.

     c)   What are stock cultures?

     d)   What are transition mutations?

     e)   Name any two agricultural waste products used as raw material for fermentation process.

     f)   What is conservative mode of DNA replication?

     g)   Define Degeneracy.

     h)   Enlist any two SOP.

     i)   Define Downstream processing.

     j)   What are okazaki fragments?

Q2) Attempt <u>any two</u> of the following :   **[10]**

     a)   Explain Watson and Crick model of DNA with the help of suitable diagram.

     b)   Explain fluctuation test to prove spontaneous nature of mutation.

     c)   Explain the various methods used for maintainance of an industrially important strain.

                                                      P.T.O.

Q3) Attempt <u>any two</u> of the following :   [10]

   a) Diagramatically represent typical batch fermenter and its parts.

   b) Describe the role of antifoam agents in fermentation process with suitable examples.

   c) Describe Griffith's experiment to prove DNA as genetic material.

Q4) Attempt <u>any one</u> of the following :   [10]

   a) Enlist different types of physical and chemical mutagens. Explain the mutagenic action of nitrous acid and alkylating agents.

   b) What is primary screening? Explain the techniques for screening of antibiotic and organic acid producers.

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[3717] - 523
S.Y. B.Sc.
STATISTICAL TECHNIQUES
STT - 212 : Statistical Techniques - II
(Sem. - I) (Old Course) (Paper - II)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

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

    4)   *Symbols and abbreviations have their usual meanings.*

Q1) Attempt each of the following :

  a)   Choose the correct alternative in each of the following :   **[1each]**

      i)   Using SRSWOR, the total number of possible samples of size 2 from a population of size 5 is :

         A)   10   B)   25   C)   3   D)   7

      ii)   The nature of OC curve for a single sampling plan is :

         A)   increasing   B)   decreasing

         C)   step function   D)   increasing first and then decreasing.

      iii)   Variance of residual $X_{1.23}$ is given by :

         A) $\sigma_1^2 (1-R^2_{2.13})$ B) $\sigma_2^2 (1-R^2_{2.13})$

         C) $\sigma_1^2 (1-R^2_{3.12})$ D) $\sigma_1^2 (1-R^2_{1.23})$

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

      i)   Multiple correlation coefficient lies between -1 to $+1$.

      ii)   The value of AOQ always lies in the interval [0,1].

      iii)   In case of stratified random sampling the estimate of population mean is a sample mean.

  c)   Define : Producer's risk.   **[1]**

  d)   Compute $r_{12.3}$ if $b_{12.3} = 0.4$ and $b_{21.3} = 1.2$.   **[1]**

  e)   State the equation of multiple regression plane of X2 on X1 and X3. **[1]**

  f)   Give one real life situation where stratification is needed.   **[1]**

Q2) Attempt <u>any two</u> of the following : **[5 each]**

a) Discuss the problem of allocation in case of stratified random sampling. Explain the procedure of proportional allocation.

b) Explain the following terms :
   i) AQL   ii) AOQ   iii) ATI.

c) Define multiple correlation in case of trivariate data. State the formula for multiple correlation coefficient $R_{1.23}$. State its important properties.

Q3) Answer <u>any two</u> of the following : **[5 each]**

a) In single sampling plan N = 10000, n = 100 and c = 3; compute AOQ and ATI if all the lots submitted are 1% defective.

b) If r_{12} = 0.7, r_{13} = 0.6 and r_{23} = 0.4, then compute $r_{12.3}$ and $R_{2.13}$.

c) List all possible samples of size 3 by SRSWOR from the population with observations 10, 18, 12, 13, 17. Also verify that sample mean is an unbiased estimator of population mean.

Q4) Attempt <u>any one</u> of the following :

a) i) Draw an OC curve for single sampling plan N = 1000, n = 100, c = 2 for lot qualities 0.005, 0.01, 0.02, 0.05, 0.06 and 0.07. Estimate the probability of acceptance of the lot for a quality 0.013 graphically. **[7]**

   ii) Explain the concept of acceptance sampling. **[3]**

b) i) Derive the equation of multiple regression plane of X1 on X2 and X3 by the method of least squares. **[7]**

   ii) In a population with 4 strata, the following information is available :

Stratum No.	Ni	Si²
1	30	36
2	50	64
3	60	81
4	60	121

   Determine the sample sizes from four strata in case of optimum allocation if the total sample size is 40. **[3]**

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[3717] - 524

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL - 211 : Circuit Design : Principles & Applications - I

(Paper - I) (Sem. - I) (Old Course) (22211)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Neat diagram must be drawn wherever necessary.*

    3)   *Figures to the right indicate full marks.*

    4)   *Use of non-programmable calculator is allowed.*

Q1) All questions are compulsory :

    a)   Define slew rate of OPAMP.   **[1]**

    b)   Define cross-over distortion.   **[1]**

    c)   State the need of heatsink.   **[1]**

    d)   Define conversion efficiency of an amplifier.   **[1]**

    e)   Enlist the characteristics of CE amplifier.   **[2]**

    f)   Enlist any four characteristics of an ideal OPAMP.   **[2]**

    g)   OPAMP is used as inverting amplifier with $R_i = 5$ k Ω, $R_f = 30$ k Ω. Find the output voltage if the input voltage is 80 mV.   **[2]**

    h)   A negative feedback is applied to an amplifier with open loop gain of 100. Find the gain of the amplifier if the feedback factor is 0.05.   **[2]**

Q2) Attempt <u>any two</u> of the following :

    a)   Distinguish between small signal & large signal amplifier.   **[4]**

    b)   Draw the circuit diagram of a single stage transistor amplifier & explain dc loadline with suitable output characteristics.   **[4]**

    c)   Draw the block diagram of OPAMP and explain all blocks in brief.   **[4]**

Q3) Attempt <u>any two</u> of the following :

    a)   State the advantages negative feedback. Show that with negative feedback distortion decreases. **[4]**

    b)   Draw the circuit diagram of class B push pull amplifier. Show that efficiency is 78.5 %. **[4]**

    c)   Draw and explain precision rectifier. **[4]**

Q4) a)   Discuss various types of coupling used in amplifier. **[6]**

    b)   Draw the circuit diagram of instrumentation amplifier using three OPAMP and derive the expression for the gain Ad. **[6]**

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

    a)   Draw the circuit diagram of a single stage class A transistor amplifier. Write mathematical calculations to design amplifier.

    b)   Draw the circuit diagram of class AB push-pull amplifier.

    c)   What is the thermal resistance? Explain its significance. Calculate the power that a transistor can safely dissipate if $T_A = 30°C$, $T_J = 130°C$ & $\theta = 10°C/W$.

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[3717] - 531
S.Y.B.Sc. (Semester - I)
OPTIONAL ENGLISH (Old Course)
Text: Indian Prose for Effective Communication
By M.Nagarajan and Others

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

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

Q1) a) Correct the following sentences. (Any Four)   **[4]**

   i) Two of the demonstrators is absent today.

   ii) The first batch finished the practical, isn't it?

   iii) Yesterday I read interesting story about C.V. Raman.

   iv) I am understanding whatever you say.

   v) He work in the factory.

   vi) A lot of peoples were enjoying the match.

   b) Fill in the blanks with suitable words given in the brackets. (Any Three)
   [3]

   i) P.C. Sarkar was an --------- magician.(artificial/artful)

   ii) The research centre stands --------------- a river.(beside/besides)

   iii) The academic ---------------- of these science students is bright.
   (career/carrier)

   iv) They grow vegetables on their ------------. (farm/firm)

   v) The table surface is ----------------. (plain/plane)

   c) Do as directed. (Any Three)   **[3]**

   i) Write two words using the suffix ' ____ment'.

   ii) The scientist uncovered the mystery. (Change the voice)

   iii) They were ------------- an experiment yesterday.(Use correct form
   of the verb 'perform')

iv) <u>Solar energy</u> can be used to generate electricity. (Frame a question to get the underlined part as answer)

v) It rained continuously ------------- three hours. (Use correct preposition)

Q.2) a) Draw a tree diagram with the help of the following information.   **[4]**

   The total of the teaching staff of National College, Chennai is 300 of which one sixth, i.e. 52 are women teachers. The teachers who have obtained qualifications above post-graduation constitute just 20% of the total staff. Among them 15 have qualified for the M.Phil. degree and 10 for the Ph.D. 238 teachers are permanent and remaining are temporary. As far as age is concerned about half of the teachers are middle aged i.e. between 31 to 45 years. The number of younger teachers i.e. those between 25 to 30 and older ones, i.e. those above 45 is approximately the same. They are 73 and 77 respectively.

OR

Write a short paragraph describing the process of admission to XI science in a college in Nashik with the help of the following points.

[Collect the form ---- fill it by giving preferences of the colleges ---- submit at the centre -- waiting list -- read allotment in the newspaper – consult a teacher fill in the form of the college allotted -- attach documents – attest photocopies ---- pay the fees]

   b) Prepare a slogan to motivate students to avoid using cell phones on academic campuses.   **[3]**

OR

Prepare a newspaper headline on the basis of the description given below.

Pune : Over 175 tennis coaches from all over the state attended the first - ever Tennis Workshop at the Balewadi Tennis Complex in the city that got underway on Saturday.

   The workshop was organised by the MSLTA in its effort to raise the level of tennis in Maharashtra and to widen the knowledge of tennis coaches, tennis professionals, trainers and those who contribute to tennis coaching.

c) Convert the following telegram in the form of a short paragraph. **[3]**

> To,   MR.SUHAS JANGALE,
>
>   SHIVAJI SOCIETY,
>
>   GANDHINAGAR, BARAMATI
>
> ---
>
> POLICY CERTIFICATE DESPATCHED STOP ACKNOWLEDGE STOP PAY PREMIUMS AT TIME STOP AVOID FINE STOP
>
>   MANAGER
>
>   LIC PUNE
>
> ---

OR

Convert the following information into a coherent paragraph.

Student strength of Various Departments in

Millennium College, Pune

Year	English	Politics	Hindi	Marathi	Economics
2000-01	11	15	10	5	10
2001-02	20	25	22	8	15
2002-03	28	36	25	15	25
2003-04	35	40	35	25	25
2004-05	45	45	34	15	35

Q3) Answer the following questions in about 30 words each. (Any Five) **[10]**

i) What do you come to know about Dr. Radhakrishnan from the text prescribed?

ii) What were the childhood experiences of Rabindranath Tagore?

iii) Compare the records of Hadlee and Kapil Dev.

iv) What according to Ira Saxena is the best way of controlling T.V. viewing?

v) What faith do the people of Kerala have about 'Katalamma'?

vi) Explain how a rabies virus acts inside the human body.

vii) What is Computer Virus? How were the first viruses created?

Q4) Answer the following questions in about 150 words each.(Any Two) **[10]**

i) Explain the central idea of the extract 'Indian Crowds'.

ii) State some of the important features of the personality of Viswanathan Anand.

iii) Why does Rajkumari Amrit Kaur say, 'our body is the most wonderful engine of all?

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P332   **[3717]-534**

S.Y. B.Sc. (Semester - I)
SANSKRIT
Suravāṇī (सुरवाणी)
(Old Pattern)

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

Q1) Write short answers in <u>2-4</u> lines of the following questions.   **[16]**

पुढील प्रश्नांची <u>2-4</u> ओळीत उत्तरे लिहा.

   i)   Why Duryodhana ashamed in Mayasabha?

         दुर्योधन मयसभेत लज्जित का झाला ?

   ii)   How did Hanuman start his speech?

         हनुमानाने त्याच्या भाषणाला कशी सुरुवात केली ?

   iii) How many kāṇḍas in Rāmāyaṇa which are they?

         रामायणात किती कांडे आहेत व ती कोणती ?

   iv) How the importance of satisfaction is described by the poet?

         कवीने सन्तोषाचे महत्त्व कसे वर्णन केले आहे ?

   v)   What was the answer of Sahasrabuddhi fish to frog?

         सहस्रबुद्धी माशाने बेडकाला काय उत्तर दिले ?

   vi) Which oath is taken by Aśvatthāmā?

         अश्वत्थामाने कोणती प्रतिज्ञा घेतली होती ?

   vii) What is सुभाषित ?

         सुभाषित म्हणजे काय ?

   viii) What is author's instruction in 'दधिकर्णकथा' ?

         दधिकर्णकथेत लेखकाने कोणता उपदेश केला आहे ?

Q2) Write short notes on <u>any two</u> of the following : (8-10 lines) **[8]**

पुढीलपैकी <u>कोणत्याही दोहोंवर</u> 8-10 ओळीत संक्षिप्त टीपा लिहा.

   i)   Duryodhan's insult in Mayasabhā.

        दुर्योधनाचा मयसभेतील अपमान.

   ii)   Character sketch of Hanuman.

        हनुमानाचे स्वभावचित्रण.

   iii) महाभारतम्.

Q3) Write short notes on <u>any two</u> of the following : (8-10 lines) **[8]**

पुढीलपैकी <u>कोणत्याही दोहोंवर</u> 8-10 ओळीत संक्षिप्त टीपा लिहा.

   i)   Character sketch of एकबुद्धिमण्डूक.

        एकबुद्धिमण्डूकाचे स्वभावचित्रण.

   ii)   Character sketch of अश्वत्थामा.

        अश्वत्थामाची व्यक्तिरेखा.

   iii) हितोपदेशः

Q4) Answer <u>any one</u> of the following questions : (16-20 lines) **[8]**

पुढीलपैकी <u>कोणत्याही एका</u> प्रश्नाचे उत्तर 16-20 ओळींमध्ये लिहा.

   i)   Write an essay on the lesson 'सुभाषितानि'.

        'सुभाषितानि' या पाठावर आधारित निबंध लिहा.

   ii)   Write a story of 'मत्स्यमण्डूक' with it's importance.

        'मत्स्यमण्डूक कथा' लिहून तिचे महत्त्व लिहा.

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[3717] - 537
S.Y. B.Sc. (Vocational)
BIOTECHNOLOGY
VOC - Biotech - 211-Molecular Biology
(Paper - I) (Sem. - I) (Old Course)

Time : 2 Hours]   *[Max. Marks : 40*
Instructions to the candidates:
1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *All questions carry equal marks.*

Q1) Answer each of the following (1 - 2 lines) :   **[10]**

a) Define : Transversion mutation.

b) What are nucleosides?

c) Write the importance of hydrogen bonds in protein structure.

d) Give the role of 'σ' in transcription process.

e) What is mRNA?

f) Enlist any two properties of mitochondrial genome.

g) What is Rho-dependent termination of transcription?

h) What are o-linked glycoproteins?

i) Write initiation codon?

j) Write the role of DNA gyrase enzyme in DNA replication?

Q2) Write short notes on any two of the following (8 - 10 lines) :   **[10]**

a) Translation initiation in eukaryotic cell.

b) Excision repair.

c) Klenow fragment.

Q3) Attempt <u>any two</u> of the following (8 - 10 lines) :   **[10]**

   a)   What is poly A tail? Write the significance of mRNA modification in eukaryotes.

   b)   Add a note on chloroplast genome.

   c)   State the properties of genetic code.

Q4) Define operon? Describe tryptophan operon in detail.   **[10]**

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

What is DNA replication? Discuss the steps involved in DNA replication process.

<div align="center">✪✫✪✫</div>

P334   **[3717] - 539**

S.Y. B.Sc. (Vocational)
ELECTRONIC EQUIPMENT AND MAINTENANCE(EEM)
VOC - EEM - 211: Audio, Video & Office Equipments - A

(Paper - I) (Semester - I) (Old Course)

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

Instructions to the candidates:
   1)   All questions are compulsory.
   2)   Figures to the right indicate full marks.
   3)   Neat diagrams must be drawn.

Q1) Answer the following :

   a)   What is AM? Where it is used.   **[1]**

   b)   Give popular channels that use AM and FM with their frequencies. **[1]**

   c)   What is AGC?   **[1]**

   d)   Compare CD with Cassette.   **[1]**

   e)   Explain the role of sync and blanking pulses.   **[2]**

   f)   Draw composite video signal.   **[2]**

   g)   What is CATV? Give its one application.   **[2]**

   h)   Differentiate between VCD and DVD.   **[2]**

Q2) Answer any two of the following :

   a)   With the help of neat diagram explain the working of AM receiver. **[4]**

   b)   Explain the biasing methods used in tape recording.   **[4]**

   c)   Explain in details stereo signal recording on tape.   **[4]**

Q3) Answer any two of the following :

   a)   Explain the working of CRT type monitor.   **[4]**

   b)   Why data compression is required? Explain it w.r.t. ACD.   **[4]**

   c)   Explain the working of ACD player.   **[4]**

Q4) Answer the following :

    a)   Draw the block diagram of B/W TV receiver. Show signals at different stages.   **[6]**

    b)   Draw the block diagram of PA system. Explain its working.   **[6]**

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

    a)   Draw the block diagram of color TV receiver.

    b)   Explain the working of CCTV system. Give its one application.

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

P335 **[3717]-540**

S.Y. B.Sc. (Vocational Course)
INDUSTRIAL MICROBIOLOGY (Theory Paper I)
VOC-IND-MIC-211: Bioreactors - Design and Operation
(Semester - I) (Old) (2004 Pattern)

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

Instructions to the candidates:
1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *All questions carry equal marks.*
4) *Draw neat labeled diagrams wherever necessary.*
5) *Use of scientific calculators is allowed.*

Q1) Answer each sub-question in one or two lines; Fill in the blanks; State whether the statement is true or false. **[10]**

a) What is the minimum H/D ratio for a laboratory fermenter?

b) Name any one organic antifoam agent.

c) Name the type of sparger used in the production level fermenter.

d) Fill in the blank:

   Drain valve in a fermenter assembly is a _____ valve.

e) Fill in the blank:

   When two organisms are used for fermentation process, it called a _____ fermentation.

f) State whether the statement is **True** or **False**

   Immobilization of microbial cells is usually done using covalent bonding.

g) State whether the statement is **True** or **False**

   A pH probe is also called a thermistor.

h) State whether the statement is **True** or **False**

   Media passed through hollow fibre reactors should not contain any suspended solids.

i) Exhaust gas from a fermenter is made sterile before letting it out, by using :

   i)   Chemicals.

   ii) Heat.

   iii) Filters.

   iv) Both filters and heat.

j) Choose the odd one out :

   i)   Rushton tubine.

   ii) Marine Propellor.

   iii) Vaned-disk impeller.

   iv) Curved blade impellor.

Q2) Answer *any two* of the following :   **[10]**

a) Explain the equipment used for providing sterile air into a fermentation broth.

b) Explain the principle and construction of an air-draft cooling tower.

c) List the methods of enzyme immobilization. Explain any one in detail.

Q3) Answer *any two* of the following :   **[10]**

a) What is a continuous fermentation? With the help of a suitable example, explain the controlling parameters of the fermentation.

b) Enlist and explain critical factors affecting design of a batch fermenter.

c) Explain the machanism of foam control during fermentation.

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

a) Draw a neat, labeled diagram of a Continuous Stirred Tank Reactor. Explain the working of the equipment required for homogenization of the broth.

b) What is *in-situ* sterilization of fermentation broth? Describe the process.

# # # #

P336   **[3717]-541**
S.Y. B.Sc. (Vocational)
COMPUTER - MAINTENANCE
Microprocessor Interfacing and Computer Hardware
(Paper - I) (Semester-I) (Old Course)

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

Instructions to the candidates:
   1)   All questions are compulsory.
   2)   Figures to the right indicate full marks.

Q1) a)   Attempt the following :   **[4 × 1 = 4]**
     State True or False only.

       i)   8086 is a 32-bit processor.
       ii)   INT 10H is called the BIOS interrupt.
       iii) Pressing of CTRL + ALT + DEL Key is an example of software interrupt.
       iv)   Mov AX, CX instruction copies the content of AX register to CX register.

     b)   Attempt the following :   **[4 × 2 = 8]**

       i)   What are the procedures in assembly language?
       ii)   Which signals are different in memory read and memory write machine cycle?
       iii) Dynamic RAM need frequent refreshing. Comment.
       iv)   What are DOS interrupts.? Explain with suitable example.

Q2) Attempt any two of the following :   **[2 × 4 = 8]**

     a)   Explain 8086 - minimum mode system.

     b)   Explain 8259; Priority Interrupt controller.

     c)   Explain the interfacing of memories to 8086 microprocessor system.

Q3) Attempt any two of the following :   [2 × 4 = 8]

   a)   Explain in brief DMA Data - Transfer.

   b)   Write an assembly language programme to clear the screen and move the cursor.

   c)   Explain the internal architecture of 8086 microprocessor with the help of neat block diagram.

Q4) Attempt any two of the following :   [2 × 6 = 12]

   a)   Give an overview of microprocessor evolution with special reference to X - 86 processors.

   b)   Explain what is an Editor, Compiler, Assembler, and Loader? How are macros useful in programming?

   c)   Explain 8086 Interrupts in detail.

# # # #

P337   **[3717]-542**
S.Y. B.Sc.
SEED TECHNOLOGY
Hybrid Seed Production
(Vocational) (Paper -III) (Sem. -I) (Old)

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

Instructions to the candidates:
    1)   All questions are compulsory.
    2)   Figures to the right indicate full marks.
    3)   Draw neat labelled diagrams wherever necessary.

Q1) Attempt the following :   **[10 × 1 = 10]**

    a)   Define heterosis.

    b)   What is apomixis?

    c)   Define homomorphic type of self incompatibility.

    d)   Give any two disadvantages of male sterility.

    e)   Define cytoplasmic-genetic male sterility

    f)   What are gametocides?

    g)   What is self pollination?

    h)   Define emasculation.

    i)   Give isolation requirement for hybrid seed production of pearl millet.

    j)   What are border rows?

Q2) Attempt <u>any two</u> of the following :   **[2 × 5 = 10]**

    a)   Describe physiological basis of heterosis?

    b)   Give role of haploid breeding in development of inbreeds with respect to maize.

    c)   Explain maintenance of seed parents in cotton.

Q3) Write short notes on <u>any two</u> of the following :　　　　　　　　**[2 × 5 = 10]**

　　a)　Planting ratio.

　　b)　Inbreeding depression.

　　c)　Pollination techniques.

Q4) Give in detail procedure of hybrid seed production in maize.　　　　**[10]**

OR

Give in detail procedure of hybrid seed production in cotton.

# # # #

[3717] - 547

S.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

VOC- IND - MIC - 212 : Screening and Process Optimization

(Paper - II) (Sem. - I) (Old) (2004 Pattern) (Theory)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

    3)   *All questions carry equal marks.*

    4)   *Draw neat labeled diagrams wherever necessary.*

    5)   *Use of scientific calculator is allowed.*

Q1) Answer each sub-question in one or two lines; Fill in the blanks; State whether the statement is true or false : **[10]**

    a)   State whether the statement is True or False
           Antifoam agents are added only after foam is produced in the fermentation broth during fermentation.

    b)   State whether the statement is True or False
           Buffering components initially present in medium are sufficient to regulate pH changes occurring during fermentation process.

    c)   Fill in the blank :
           Amylase is a_____type of enzyme.

    d)   Fill in the blank :
           The soil culture method can be used for preservation of ____ type of cultures.

    e)   Fill in the blank :
           Feedback inhibition and repression frequently are in concert in the control of _____type of pathway.

    f)   Fill in the blank :
           Giant colony method is_____screening method.

    g)   Define : Decimal Reduction Time (DRT).

    h)   Define : 'Dummy Variables'.

    i)   State any one objective of scale-up.

    j)   Give the method to monitor cell mass production during fermentation.

P.T.O.

Q2) Answer <u>any two</u> of the following : [10]

a) What are auxotrophic mutants? How are they used for fermentation process to achieve overproduction of primary metabolites?

b) Justify 'Scale-up operation is an important process in achieving final product formation on economical scale'.

c) Give salient features of Plackett-Burman design.

Q3) Answer <u>any two</u> of the following : [10]

a) Explain why monitoring of medium components is necessary during course of fermentation.

b) Draw the flow chart of inoculum build-up.

c) What are the different levels of fermentation? Give their role in fermentation process development.

Q4) Answer <u>any one</u> of the following : [10]

a) Discuss the various raw materials used as source of nitrogen in fermentation media.

b) Describe the methods used for screening of organic acid and antibiotic producing bacteria.

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[3717] - 548
S.Y. B.Sc.
COMPUTER MAINTENANCE
Trouble Shooting of Computers
(Paper - II) (Old Course) (Vocational) (Sem. - I) (28721)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

Q1) a)   Attempt any four :   **[4 × 1 = 4]**

       i)   What does MIDI stand for?

       ii)   What is Green PC?

       iii)   What do you mean by Resolution of a display system?

       iv)   Why do you think that PCI bus architecture is presently the most widely used in PCs?

       v)   List any two non-Intel microprocessors.

   b)   Attempt any two :   **[2 × 2 = 4]**

       i)   What is the rate of data transfer achieved by a bus using 8-bit data bus, operating at 10MHz and having 8-bits transferred in one cycle.

       ii)   What is the maximum addressable memory of a bus architecture which uses 30 address lines?

       iii)   What is the amount of video RAM required for a video card which uses 24 colours with a resolution of 768 × 1024.

   c)   Comment on any Two of the following :   **[2 × 2 = 4]**

       i)   Green PC standard greatly enhances power efficiency.

       ii)   UPS is one of the basic necessity of a computer system.

       iii)   EISA is a high speed, high bandwidth bus architecture.

Q2) Attempt <u>any two</u> of the following :   [2 × 4 = 8]

    a)   Explain the following terms related to display system Pixel, Scanning, Colour depth, Colour palette.

    b)   Describe in brief, the hard disk interfaces you know.

    c)   What is an Expansion bus? Describe its features.

Q3) Attempt <u>any two</u> of the following :   [2 × 4 = 8]

    a)   Describe the importance and need of Electrical Earthing.

    b)   What are Chipsets? Explain their significance and functions in brief.

    c)   What do you mean by a Multimedia PC? List its minimum requirements.

Q4) Attempt <u>any two</u> of the following: [2 × 6 = 12]

    a)   Draw and explain the block diagram of a OFF-LINE UPS.

    b)   Starting from power on, explain the booting operation of a PC in detail.

    c)   Write the main functions of a display adapter. List different display adapters you know and explain the features of any one.

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