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P521

[3717] - 601

S.Y. B.Sc.

MATHEMATICS

MT - 221 : Linear Algebra - II

(Sem. - II) (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.*

Q1) Answer the following questions.

[10]

- a) If $\det(A) = 5$ then find $\det(B A^3 B^{-1})$.
- b) Verify the identity, $a_{12}C_{12} + a_{22}C_{22} = \det(A)$ for matrix $A = \begin{pmatrix} 1 & -2 \\ -3 & 5 \end{pmatrix}$.
- c) If A is invertible matrix, prove that $\det(A^{-1}) = \frac{1}{\det(A)}$.
- d) Write the number of inversions in the permutation $\sigma = (2, 6, 3, 4, 1, 5)$.
- e) Find the condition that b 's must satisfy for the system to be consistent :
$$\begin{aligned} 6x - 10y &= b_1 \\ 3x - 5y &= b_2. \end{aligned}$$
- f) In any inner product space V and $\bar{u}, \bar{v} \in V$, if $\langle \bar{u} + \bar{v}, \bar{u} - \bar{v} \rangle = 0$ then prove that $\|\bar{u}\| = \|\bar{v}\|$.
- g) If $\bar{u} = (3, 4, 5)$ then evaluate $\|-6\bar{u}\| + 2\|\bar{u}\|$.
- h) If -1 and 7 are eigen values of A , then find the eigen values of A^3 .
- i) Express the quadratic form $x_1^2 + 2x_2^2 - 5x_3^2 - 6x_1x_2 + 8x_2x_3$ in matrix notation $X^t A X$, where A is symmetric matrix.
- j) If $\bar{u} = (2, 1, 3)$ and $\bar{v} = (1, 7, k)$ are orthogonal vectors in an Euclidean inner product space R^3 , find value of K .

P.T.O.

Q2) Attempt any two of the following:

[10]

- a) Evaluate determinant of matrix

$$A = \begin{pmatrix} 2 & 5 & 5 \\ -1 & -1 & 0 \\ 2 & 4 & 3 \end{pmatrix}$$

by using signed elementary products.

- b) Prove that a square matrix A is invertible if and only if $\det A \neq 0$.

- c) Let P_2 be vector space with inner product $\langle p, q \rangle = \int_{-1}^1 p(x)q(x)dx$, show that $p(x) = x$, $q(x) = x^2$ are orthogonal. Further verify Pythagorus theorem.

Q3) Attempt any two of the following:

[10]

- a) State and prove Cauchy - Schwarz's inequality for real inner product space.
- b) Find eigen space corresponding to largest eigen value of the matrix.

$$A = \begin{pmatrix} 2 & -1 & 1 \\ 0 & 3 & -1 \\ 2 & 1 & 3 \end{pmatrix}$$

- c) Test the consistency and solve the system, if consistent.

$$2x + 2y + 2z = 0$$

$$-2x + 5y + 2z = 1$$

$$8x + y + 4z = -1$$

Q4) Attempt any one of the following:

[10]

- a) Define characteristic polynomial of $n \times n$ matrix A. State and prove Cayley - Hamilton theorem and verify it for

$$A = \begin{pmatrix} 3 & 2 \\ -1 & 0 \end{pmatrix}.$$

- b) i) Transform the basis set $S = \{(1, 1, 1), (1, 1, 0), (1, 0, 0)\}$ of Euclidean inner product space \mathbb{R}^3 to the orthonormal basis set, by using Gram - Schmidt process. [6]
- ii) For the matrix $A = \begin{pmatrix} -4 & 2 \\ 7 & 8 \end{pmatrix}$, verify that $A \cdot \text{adj}(A) = |A| \cdot I_2$. [4]



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[3717] - 602

S.Y. B.Sc.

MATHEMATICS

MT - 222 : Vector Calculus

(Sem. - II) (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) Answer the following questions :

[10]

- a) The function $\vec{f}(t) = \left(\frac{t^3 - 8}{t^2 - 4} \right) \vec{i} + t^2 \vec{j}$ is continuous at $t = 2$, find $\vec{f}(2)$.
- b) If $\vec{r} = \vec{a} \cos wt$, where \vec{a} is constant vector, then compute $\vec{r} \times \frac{d\vec{r}}{dt}$.
- c) Find unit tangent vector to the curve $\vec{r} = t^2 \vec{i} + 2t \vec{j} - \frac{t^2}{2} \vec{k}$ at the point $t = 1$.
- d) Show that 't' measures the arc length for the curve
$$\vec{r}(t) = \frac{1}{\sqrt{2}} \sin t \vec{i} + \frac{1}{\sqrt{2}} \sin t \vec{j} + \cos t \vec{k}$$
- e) A particle moves along a curve $\vec{r}(t) = e^t \vec{i} + e^{-t} \vec{j} + \sqrt{2t} \vec{k}$ find acceleration at time $t = 0$.
- f) Find $\nabla(\vec{r} \cdot \vec{a})$, where \vec{a} is a constant vector and $\vec{r} = x \vec{i} + y \vec{j} + z \vec{k}$.
- g) If $\vec{r} = x \vec{i} + y \vec{j} + z \vec{k}$, find $\text{div}(\vec{r})$.
- h) Find normal vector to the surface $\phi(x, y, z) = xy^2 + yz^3$ at $(2, -1, 1)$.
- i) Show that the vector $\vec{v} = \frac{y^2}{2x} \vec{i} + y \log x \vec{j}$ is irrotational.
- j) Evaluate line integral of $\vec{f} = y \vec{i} + 2xy \vec{j}$ along the path $x = t, y = t$ from $t = 0$ to $t = 1$.

P.T.O.

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

- Compute the triplet of unit vectors $\bar{\alpha}, \bar{\beta}, \bar{\gamma}$ and the curvature for the curve $x = \frac{1}{\sqrt{2}} \sin S$, $y = \frac{1}{\sqrt{2}} \sin S$, $z = \cos S$.
- If $\bar{f} = e^x \sin y \bar{i} + e^x \cos y \bar{j}$ and $x = t^2$, $y = 1 - t^2$, Find $\frac{d\bar{f}}{dt}$.
- Find the directional derivative of $\phi(x, y, z) = 2x^3y - 3y^2z$ at $(1, 2, -1)$ towards $Q(3, -1, 5)$. State whether ' ϕ ' is increasing or decreasing.

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

- If $\phi(x, y, z)$ is a scalar function then show that $\text{curl}(\text{grad } \phi) = \bar{0}$.
- Define solenoidal vector field and show that $\bar{u} = 3x^4z^2\bar{i} + 4xz^2\bar{j} - 4x^3z^3\bar{k}$ is solenoidal.
- Show that $\bar{f} = (2xy + z^3)\bar{i} + x^2\bar{j} + 3xz^2\bar{k}$ is conservative. Find the scalar potential ϕ associated with \bar{f} .

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

- Using Green's theorem evaluate $\oint_C [(2xy - x^2)dx + (x + y^2)dy]$ where 'C' is the boundary of the region bounded by $y = x^2$, $y^2 = x$.
 - Using Divergen's theorem show that $\iint_S \bar{f} \cdot \bar{n} ds = 84\pi - 128$ where $\bar{f} = 4x\bar{i} - 2y^2\bar{j} + z^2\bar{k}$ and S is the surface of region bounded by $x^2 + y^2 = 4$, $z = 0$, $z = 3$.
- State Stoke's theorem and verify the same for the function $\bar{f} = (2x - y)\bar{i} - yz^2\bar{j} - y^2z\bar{k}$ over upper half surface of the sphere $x^2 + y^2 + z^2 = 1$, 'C' is the boundary of S given by $x = \cos \theta$, $y = \sin \theta$, $z = 0$, $(0 \leq \theta \leq 2\pi)$.



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P523

[3717] - 603

S.Y. B.Sc.

MATHEMATICS

MT - 223 and MT - 224

(Sem. - II) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates :

- 1) Candidates are advised to see the relevant question paper and solve the same.
- 2) In each question paper, all questions are compulsory.
- 3) Figures to the right indicate full marks.

MT - 223 : Complex Variables

Q1) Answer the following questions :

[10]

- a) Is the set $\{z \mid z \text{ is real and } 0 \leq z < 1\}$ open or closed subset of \mathbb{C} ? Justify.
- b) Find the boundary of the set $\{z \in \mathbb{C} \mid |z| \leq 1\}$.
- c) Determine the points of discontinuity of the function $f(z) = \frac{z^2 + 2z + 3}{z^2 + 2z - 3}$.
- d) Evaluate $\lim_{z \rightarrow 4i} \frac{z^2 + 16}{z - 4i}$.
- e) Show that $\exp(4 + 5\pi i) = -\exp(4)$.
- f) Prove that $\sin^2 z + \cos^2 z = 1$.
- g) Find zeros of the function $f(z) = z^3 + 3z^2 - z - 3$.
- h) Evaluate $\int_C (3z - 1) dz$ where C is the straight line segment from $z = -i$ to $z = i$.
- i) Determine the poles and their orders of the function $f(z) = \frac{1}{(z - 5)^3 (z - 4)^2}$.
- j) Find the residue of the function $f(z) = \frac{z^2}{(z - 1)(z - 2)(z - 3)}$ at the pole $z = 2$.

P.T.O.

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

- a) Prove that a function of a complex variable z is differentiable at z_0 , then it is continuous at z_0 . Is the converse true? Justify.
- b) If $f(z)$ is continuous at $z = 1 + i$, find $f(1 + i)$ where

$$f(z) = \frac{z^4 + 4}{z - (1 + i)} \text{ (if } z \neq 1 + i \text{)}.$$

- c) Find an analytic function whose real part is $u = y^3 - 3x^2y$.

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

- a) Prove that the real and imaginary parts of any analytic function $f(z) = u + iv$ are harmonic functions.
- b) Find all values of $(1 + i)^{-i}$.
- c) Find real and imaginary parts of $\tan z$.

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

- a) If $f(z)$ is analytic within and on a closed contour C and z_0 is any point inside C , then prove that $f(z_0) = \frac{1}{2\pi i} \int_C \frac{f(z)}{z - z_0} dz$ and hence evaluate

$$\int_C \frac{z + 6}{z^2 - 4} dz, \text{ where } C \text{ is the circle } |z + 2| = 1.$$

- b) i) State Cauchy's Residue theorem and using it, evaluate

$$\int_C \frac{3z^2 + 2}{(z - 1)(z^2 + 9)} dz \text{ where } C \text{ is the circle } |z - 2| = 2.$$

- ii) Obtain Laurent's series expansion of $f(z) = \frac{1}{z^2 - 3z + 2}$ for $1 < |z| < 2$.



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P523

[3717] - 603

S.Y. B.Sc.

MATHEMATICS

MT - 223 and MT - 224

(Sem. - 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.

MT - 224 : Differential Equations and Laplace Transforms

Q1) Answer the following questions :

[10]

- a) Solve the differential equation $(\Delta^2 + 5\Delta + 3)y = 0$.
- b) Solve the differential equation $(5\Delta - 1)^2 y = 0$.
- c) Find a particular solution of $(\Delta^2 - 5\Delta + 6)y = e^{2x}$.
- d) State the formula for $\frac{1}{f(\Delta)} xV$, where V is a function of x only.
- e) Find the Wronskian of the functions x, xe^x .
- f) If $L\{f(t)\} = \frac{S}{S^2 - 2S}$, then evaluate $\int_0^\infty e^{-2t} f(t) dt$.
- g) Let $f(t) = \begin{cases} e^t & \text{if } 0 < t \leq 1 \\ 0 & \text{if } t > 1 \end{cases}$. Find $L\{f(t)\}$.
- h) Find the inverse transform of $\frac{3}{S^2 + 2S + 10}$.
- i) Define exponential order of a function as $t \rightarrow \infty$.
- j) Find $L\{3te^t\}$.

P.T.O.

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

- a) Let $f(\Delta)$ be a polynomial in Δ with constant coefficients. Prove that

$$\frac{1}{f(\Delta)} e^{ax} = \frac{1}{f(a)} e^{ax}, \text{ provided } f(a) \neq 0.$$

- b) Solve the equation $(\Delta^2 - 4)y = e^x + \sin 2x$.

- c) Solve the equation $(\Delta^2 - 3\Delta + 7)y = 10xe^{2x}$.

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

- a) Explain the method of variation of parameter to solve the non-homogeneous differential equation

$$\frac{d^2 y}{dx^2} + P_1(x) \frac{dy}{dx} + P_2(x)y = q(x).$$

- b) Evaluate $\int_0^{\infty} e^{-2t} \cos^3 t \, dt$.

- c) Find the Laplace transform of $\sin^2 kt$ and deduce that of $\cos^2 kt$.

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

- a) Explain the method of reduction of order to solve the differential equations $y'' + P(x)y' + q(x)y = R(x)$ where $P(x)$, $q(x)$ and $R(x)$ are continuous functions on an interval I . Hence solve $(\Delta^2 + 1)y = \sec x$ completely.

- b) i) If $L\{f(t)\} = \phi(s)$ then prove that $L\{t^n \phi(s)\} = (-1)^n \frac{d^n}{ds^n} \phi(s)$ where n is positive integer.

ii) Find $L^{-1} \left\{ \log \sqrt{\frac{s^2 + b^2}{s^2 + a^2}} \right\}$.



Total No. of Questions : 4]

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P525

[3717] - 605

S.Y. B.Sc.

PHYSICS

PH - 222 : Instrumentation

(Sem. - II) (21222) (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 diagrams must be drawn wherever necessary.**
- 4) Use of calculator and log-table are allowed.**

Q1) Attempt all of the following :

- a) Define the term sensitivity. **[1]**
- b) Convert 68° Fahrenheit to degree celcius. **[1]**
- c) State Bernoulli's theorem. **[1]**
- d) Define transducer. **[1]**
- e) What do you mean by primary standards of measurement? **[1]**
- f) State the advantages of Radiation pyrometers. **[1]**
- g) A strain gage with a gage factor 2 is cemented to a steel member which is subjected to a strain of 10^{-6} . If for no strain, the original resistance of the gage is 100Ω , calculate the change in gage resistance. **[1]**
- h) State the principle of diaphragm pressure gauge. **[1]**
- i) State the application of Hysteresis. **[1]**
- j) Explain the term Hygrometry. **[1]**

Q2) Attempt any two of the following :

- a) What is Calibration? Explain Calibration of voltmeter using potentiometer. **[5]**
- b) What is MRI? Explain physics involved in MRI. **[5]**
- c) Describe the working of LVDT. **[5]**

P.T.O.

Q3) Attempt any two of the following :

- a) A platinum resistance has a resistance of 110 at 20°C. Determine its resistance at 55°C. Temperature coefficient of resistance of platinum is 0.0039 /°C. [5]
- b) A Pitot tube is fixed in a water pipe line of diameter 20cm. If velocity of liquid through pipe is 100 cm/s. Determine Rate of flow of water through pipe. [5]
- c) A voltmeter having range 0-250V is connected across a resistor. It reads 180 Volt. If actual voltage across the resistor is 175 volt, calculate the accuracy of measurement in terms of percentage of true value and percentage of full scale deflection. [5]

Q4) a) Attempt (A) or (B) of the following :

- A)
 - i) Describe the principle, construction and working of thermocouple used for temperature measurement. [4]
 - ii) State principle and working of diaphragm pressure gauge. [4]
- B)
 - i) What is Hall effect? Explain the method of measurement of magnetic field by Hall probe. [4]
 - ii) What do you mean by air pollution? Discuss various causes of air pollution. [4]
- b) Attempt any one of the following :
 - i) Distinguish between the static characteristics Accuracy and Precision. [2]
 - ii) When input voltage of an instrument changes from 10V to 12V, the corresponding output voltage changes from 50V to 60V. What will be the sensitivity of instrument. [2]



Total No. of Questions : 4]

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P525

[3717] - 605

S.Y. B.Sc.

PHYSICS

PH - 222 : Electronics

(Sem. - II) (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) Draw neat diagrams wherever necessary.
- 4) Use of log-table and calculator is allowed.
- 5) Symbols have their usual meanings.

Q1) Attempt all of the following :

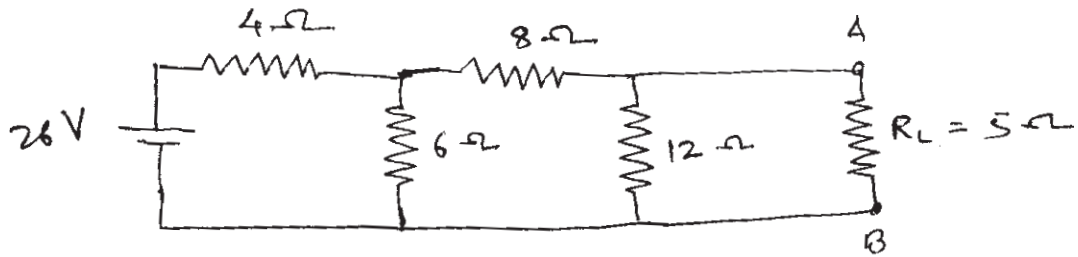
- a) What is CMRR? [1]
- b) Convert $(140)_{10}$ to binary number. [1]
- c) Add $(1010)_2$ and $(1101)_2$. [1]
- d) Give basic types of feedback. [1]
- e) State Thevenin's theorem. [1]
- f) What is line regulation? [1]
- g) In a proper biasing of transistor amplifier which type of bias is used for base-emitter junction. [1]
- h) Define intrinsic stand-off ratio. [1]
- i) Give relation for power dissipation in a resistive load. [1]
- j) What is intrinsic semi conductor? [1]

Q2) Attempt any two of the following :

- a) Describe the following gates with symbol and truth table
 - i) Nand Gate
 - ii) EX-OR Gate. [5]
- b) Explain construction and working of UJT. [5]

P.T.O.

- c) Find the Norton's equivalent circuit of the following circuit and calculate the current flowing through 5Ω resistor. [5]



Q3) Attempt any two of the following :

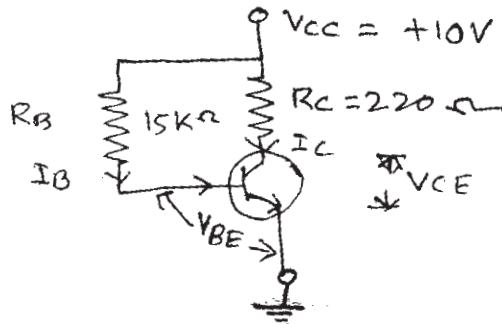
- a) Discuss the principle parts of ECG machine. [5]
 b) Give the circuit diagram of RS-Flip Flop using NAND gate. Explain its working with truth table. [5]
 c) Simplify the expression

$$AB + A(B + C) + B(B + C)$$

using Boolean algebra and draw the logic diagram. [5]

Q4) Attempt (a) or (b) of the following :

- a) i) Explain the construction and working of FET. [5]
 ii) Find V_{CE} & I_C for the following circuit.
 Given $B = 50$, $V_{BE} = 0.6V$ [5]



- b) i) Draw the circuit diagram for OPAMP as an adder & explain. [5]
 ii) A bridge rectifier is directly operated on a.c. supply voltage of 230V, 50 Hz. If the load resistance is 100Ω and diode forward resistance is 1Ω , calculate average load voltage, rms load voltage and ripple factor. [5]



Total No. of Questions : 4]

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P534

[3717] - 614

S.Y. B.Sc.

STATISTICS

ST - 221 : Statistical Methods - I

(Sem. - 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) *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) A statistical hypothesis is
 - 1) a statement about the test statistic.
 - 2) an imaginary abstract concept.
 - 3) an ideal value of the parameter.
 - 4) a statement about the parameter of distribution.
 - ii) If Laspeyre's index number is 130 and Paasche's index number is 150 then Fisher's index number and Drobish-Bowley's index number respectively are :
 - 1) 140, 280.
 - 2) 280, 140.
 - 3) $140, \sqrt{130 \times 150}$.
 - 4) $\sqrt{130 \times 150}, 140$.
 - iii) Partial correlation coefficient is invariant under the change of
 - 1) Origin.
 - 2) Scale.
 - 3) Origin and scale.
 - 4) Neither origin nor scale.
- b) State whether the given statement is true or false in each of the following : **[1 Each]**
 - i) Price relative is the difference between current year price and base year price.
 - ii) The distribution of test statistic is independent of unknown parameter.

P.T.O.

- iii) The sum of product of two residuals remains unaltered even though the common secondary subscript dropped from residual of lower order.
- c) If $\sigma_1 = 3$, $R_{11} = 0.578$ and $|R| = 0.758$ then find $\text{Var}(X_{1.23})$. [1]
- d) Define the term : Critical region. [1]
- e) Give test statistic for testing $H_0: \rho_1 = \rho_2$ against $H_1: \rho_1 \neq \rho_2$, where ρ_1 and ρ_2 are population correlation coefficient. [1]
- f) Are the following data consistent :
- $$r_{12} = 1, r_{13} = 1, r_{23} = 0. \quad [1]$$

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

- a) If $X_1 = Y_1 + Y_2$, $X_2 = Y_2 + Y_3$, $X_3 = Y_3 + Y_1$, where Y_1, Y_2, Y_3 are mutually uncorrelated variables with mean 0 and unit standard deviation, find the multiple correlation coefficient between X_1 and X_2, X_3 .
- b) A certain factory, runs in two shifts. A sample of 1000 items selected from production of day shift, gave 52 defective items. However a sample of 700 items selected from production of night shift revealed 45 items defective. Can we conclude that proportion of defective items in the first shift is less than that of second shift? Use 5% level of significance.
- c) Explain :
- Factor reversal test.
 - Circular test for an index number.

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

- a) Describe large sample test for testing $H_0: \mu = \mu_0$ against the alternatives
- $H_1: \mu > \mu_0$
 - $H_1: \mu < \mu_0$
 - $H_1: \mu \neq \mu_0$

When a random sample of size n is drawn from the population with mean μ and known variance σ^2 .

- b) With usual notation, prove that,

$$1 - R_{1.23}^2 = (1 - r_{12}^2) (1 - r_{13.2}^2) = (1 - r_{13}^2) (1 - r_{12.3}^2)$$

- c) Splice the two series together so as to give a continuous series with base year 1980.

Year	1980	1981	1982	1983	1984	1985	1986
Series A with base year 1980	100	125	140	160	-	-	-
Series B with base year 1983	-	-	-	100	130	150	170

Q4) Attempt any one of the following :

- a) i) Derive the equation of least square regression plane of X_1 on X_2 , X_3 . [7]
- ii) Given the following data :
- $$\sum p_0 q_0 = 8x + 16, \quad \sum p_1 q_1 = 24$$
- $$\sum p_0 q_1 = 4 + 4x, \quad \sum p_1 q_0 = 60$$
- Find the value of x if ratio of Laspeyre's price index number to that of Paasche's is 15 : 14. [3]
- b) i) What is a cost of living index number? Discuss any two main steps in the construction of cost of living index number. [5]
- ii) Derive the formula for the partial correlation coefficient $r_{12.3}$ in terms of total correlation coefficients. [5]



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P697

[3717] - 640

S.Y. B.Sc. (Vocational)

COMPUTER MAINTENANCE

Microprocessor Interfacing and Computer Hardware

(Paper - I) (Old Course) (28712) (Sem. - II)

Time : 2 Hours]

[Max. Marks : 40

Instruction to the candidates :

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

Q1) Attempt the following :

[8 x 2 = 16]

- a) What does CCD stand for and where is it used?
- b) List two parameters of DAC.
- c) What do GPIB and HPIB stand for?
- d) Write any two high power devices which can be interfaced to a Microcomputer.
- e) What do you mean by 'Polling' technically?
- f) Write an advantage of LCD display over CRT display.
- g) Write different types of keys used in keyboards.
- h) List any two Multi-user Operating Systems.

Q2) Attempt any two of the following :

[2 x 4 = 8]

- a) Compare the features of 80286, 80386 and 80486 processors.
- b) Explain the mechanism of interfacing a sensor or transducer to a microcomputer.
- c) Explain the interfacing of keyboards to a microprocessor based system.

Q3) Attempt any two of the following :

[2 x 4 = 8]

- a) Explain the method of Speech recognition using a computer.
- b) Explain the principle of Optical Storage devices listing their different types and features.
- c) Explain the features of Centronics Parallel Interface for printers in detail.

P.T.O.

Q4) Attempt any one of the following :

[1 x 8 = 8]

- a) Explain different types of Serial data transmission methods and standards in detail.
- b) What points need to be considered in deciding the type of interface needed while interfacing devices to a microcomputer. Explain different ways of doing so.



Total No. of Questions : 4]

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P698

[3717] - 647

S.Y. B.Sc. (Vocational)

COMPUTER MAINTENANCE (P - II)

Trouble Shooting of Computers

(Paper - II) (Old Course) (28722) (Sem. - II)

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 : **[16]**

- a) Write any two common troubles that can occur in modern PC.
- b) List any four electronic components found on motherboard.
- c) Write any two safety precautions that should be taken while troubleshooting.
- d) How can we clean the floppy disk head?
- e) List any two Serial Port problems.
- f) What is Corrosion?
- g) How will you prevent your PC from the Power line problems?
- h) What are the ill-effects of dust on PC?

Q2) Attempt any two : **[8]**

- a) What is the effect of electrostatic discharge? How to prevent it?
- b) Explain keyboard and mouse problems and the measures for their troubleshooting.
- c) Explain preventive maintenance of printer and power supply.

Q3) Attempt any two : **[8]**

- a) Explain precautions that should be taken while handling disk drives.
- b) List and explain possible video display failures.
- c) How can system designer reduce the effect of Electromagnetic Interference and Radio Frequency Interference?

Q4) Attempt any one : **[8]**

- a) List and explain various display adaptors.
- b) List and explain various “repair generated failures”.



P524

[3717] - 604

S.Y. B.Sc.

PHYSICS

PH - 221 : Oscillations, Waves and Sound

(Paper - I) (Old Course) (Sem. - 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 log table is allowed.**
- 4) Neat diagrams must be drawn wherever necessary.**

Q1) Attempt all of the following :

- a) If the potential energy of the oscillator performing simple harmonic motion is $\frac{1}{2}kx^2$, then find the restoring force acting on it. **[1]**
- b) What do you mean by critically damped motion? **[1]**
- c) What are coupled oscillations? **[1]**
- d) What are P-waves? **[1]**
- e) Distinguish between the Doppler effect in sound and that in light. **[1]**
- f) State factors on which pitch of sound depends. **[1]**
- g) One end of the spring is fixed to rigid support and some mass is attached to its free end. If extension produced in the spring is 14cm and its force constant is 210 N/m, then find the mass attached to the spring.**[1]**
- h) The frequency of a damped oscillator of mass 5 gram is 8Hz. If coefficient of damping is 0.3142 dyne/cms⁻¹. Find its quality factor.**[1]**
- i) What are forced oscillations? Give two examples? **[1]**
- j) The velocity of sound in liquid is 1500 m/s and its bulk modulus is 2.25×10^9 N/m². Determine the density of the liquid. **[1]**

P.T.O.

Q2) Attempt any two of the following :

- a) Prove that the average rate of loss of energy over period T for an oscillator performing forced oscillation is $\frac{1}{2} A^2 q^2 R$. [5]
- b) A particle is subjected to two perpendicular simple harmonic motions given by
- $$x = a \sin \omega t$$
- and $y = b \sin(\omega t + \phi)$
- show that the resultant path of the particle is an ellipse for phase difference $\pi/2$. [5]
- c) Obtain the expression for acoustic pressure and show that the intensity of sound varies directly as square of excess pressure. [5]

Q3) Attempt any two of the following :

- a) Velocity of star moving away from the earth is 6×10^3 m/s. Find the displacement of a spectral line of wavelength 6000\AA in the spectrum of star from its natural position. [5]
- b) The equation of forced oscillations of a body is given by

$$\frac{d^2 y}{dt^2} + 2 \frac{dy}{dt} + 7y = 4 \sin 2t$$

Find i) Velocity amplitude

ii) Maximum kinetic energy in SI units. [5]

- c) Calculate energy density and intensity of plane progressive wave of frequency 300 Hz. of amplitude 0.07cm and of velocity 330m/s. The density of medium is $1.293 \times 10^{-3} \text{gm/cm}^3$. [5]

Q4) Attempt the following :

- a) i) What are Lissajous figures? Explain optical method for obtaining Lissajous figures. [4]
- ii) Show that Doppler effect is assymetric in sound. [4]

OR

- i) Set up differential equation for damped electrical oscillations and hence obtain an expression for the frequency of oscillations. [4]
 - ii) Obtain expression for energy density of a plane progressive wave propagating through a medium. [4]
- b) Attempt any one of the following :
- i) If restoring force per unit displacement is 7 N/m acts on oscillator of mass 3×10^{-2} kg. If coefficient of damping is 0.5 N/ms^{-1} , show that the motion is oscillatory. [2]
 - ii) The stroboscopic disc is illuminated by a neon lamp. Dots in a certain ring appeared stationary when disc was making 20 revolutions / sec. Determine the number of dots in the ring. The frequency of A.C. used for lamp is 50 Hz. [2]



Total No. of Questions :4]

[Total No. of Pages : 2

P526

[3717] - 606

S.Y. B.Sc.

CHEMISTRY

CH - 221 : Inorganic Chemistry

(Old) (Sem. - 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) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following :

[10]

- a) What is mineral?
- b) What is role of cryolite in metallurgy of Aluminium?
- c) What is steel?
- d) Why electronegativity of silicon and Germanium is nearly same?
- e) Which metal ion is responsible for 'ouch-ouch' disease?
- f) What is meant by aprotic solvents?
- g) Cotton clothes are dried later than synthetic clothes.
- h) Explain term 'diamagnetism'.
- i) Which are major nutrients to plant?
- j) Define oxyacids.

Q2) Attempt any two of the following :

[10]

- a) Write names, symbols and electronic configuration of VI A group elements. Explain the trends in following properties.
 - i) Atomic size.
 - ii) Ionisation potential.
- b) Explain the concept of acid-base according to Lewis theory. Give types of Lewis acids with suitable example.

P.T.O.

- c) Answer the following :
- i) What is Roasting?
 - ii) What is biochemical effect of Cd^{2+} ion?

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

- a) What are d block elements? Explain following properties of d block elements.
 - i) Catalytic Activity.
 - ii) Colour.
- b) How Aluminium is refined by Hoope's process? Explain with diagram.
- c) Answer the following :
 - i) Give different type of Hydrogen bonding with suitable example.
 - ii) Give classification of plant nutrients.

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

- i) What is cast iron? How it is manufactured by blast furnace method?
- ii) Explain basic Bessemer process of manufacture of steel. Give its disadvantages.

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

- i) Give anomalous behaviour of oxygen.
- ii) What is oxyacid? Discuss trends in strength of oxyacids.

#

P527

[3717] - 607

S.Y. B.Sc.

CHEMISTRY

CH - 222 : Analytical Chemistry

(21322) (Theory) (Old Course) (Sem. - 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 logarithmic table and calculator is allowed.**
- 4) Neat diagram must be drawn wherever necessary.**

Q1) Answer the following :

[10]

- a) What is the Gross sample?
- b) Define common ion effect.
- c) Define empirical formula.
- d) How is cell constant determined experimently?
- e) Define the term precision.
- f) What do you mean by λ_{\max} in colorimeter?
- g) Give any two advantages of GLC.
- h) Which is the group reagent for IV group?
- i) Give any two requirements of a primary standard substance.
- j) What is the neutralization point of a titration?

Q2) a) Answer any two of the following :

[6]

- i) What do you understand by the term significant figures? Explain it with suitable example.
 - ii) Discuss the use of NOOH or KOH in the separation of group II cations.
 - iii) Explain a conductometric titration between a strong acid and a strong base.
- b) When a solution of concentration $1 \times 10^{-3} \text{ M}$ is placed in a 4cm pathlength cell shows an absorbance of 0.5. What will be the absorbance of the solution, if it is placed in a 2cm pathlength cell?

[4]

P.T.O.

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

- i) Describe carius method of estimation of halogens in organic compound.
- ii) Explain displacement titration with the help of suitable example.
- iii) Explain the TLC technique with special reference to
 - I) Stationary and mobile phase.
 - II) Development of chromatogram and
 - III) Detection of component spots.

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

- i) In Liebig's estimation of carbon and hydrogen 0.32gm of an organic compound gave an combustion 0.411gm of carbondioxide and 0.131gm of water. What is the percentage of carbon and hydrogen in the compound.
- ii) The percentage of chloride in a compound was reported by different students as 29.34, 29.24, 29.31, and 29.23%. Calculate the mean deviation, standard deviation and relative mean deviation in the results.

Q4) Attempt any two of the following : [10]

- a) Discuss the construction and working of simple colorimeter.
- b) What is the Redox titration? Discuss the titration curve between Fe^{+3} and Ce^{+4} ions.
- c) Explain the method of purification of water by ion exchange resins.



Total No. of Questions :4]

[Total No. of Pages : 2

P528

[3717] - 608

S.Y. B.Sc.

BOTANY

**BO - 221 : Plant Biotechnology
(Old Course) (Paper - I) (Sem. - II)**

Time :2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Attempt the following :

[10]

- a) Give any two substrates used in fermentation.
- b) Give any two applications of Biotechnology in Industry.
- c) What is explant?
- d) Write any two types of Biofertilizers.
- e) Define Genetic Engineering.
- f) What is Biological Composting?
- g) Give any two advantages of Biogas.
- h) What is Bioreactor?
- i) What is COD?
- j) What is Micropropagation?

Q2) Answer any two of the following :

[10]

- a) Describe Stirred Tank Bioreactor.
- b) Explain the properties of restriction enzymes.
- c) Give the advantages of Biofuels.

P.T.O.

Q3) Write short notes on (any two) :

[10]

- a) Applications of Tissue culture in Agriculture.
- b) Multidisciplinary nature of Biotechnology.
- c) Batch culture.

Q4) Describe the various steps involved in manufacture of Citric Acid.

[10]

OR

Give the outline Technique of Genetic Engineering.

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Total No. of Questions :4]

[Total No. of Pages : 2

P529

[3717] - 609

S.Y. B.Sc.

BOTANY

**BO - 222 Plant physiology
(Old Course) (Paper - II) (Sem. - 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) *Draw neat labeled diagrams wherever necessary.*

Q1) Attempt the following :

[10]

- a) Enlist applications of plant physiology.
- b) Define hypotonic solution.
- c) What is Diffusion Pressure Deficit.
- d) State significance of Imbibition.
- e) What is Faliar Nutrition.
- f) Enlist any two essential elements.
- g) State any two factors affecting salt absorption.
- h) What is ascent of sap?
- i) Enlist phases of Growth.
- j) State two methods for measurement of Growth.

Q2) Answer the following questions (any two) :

[10]

- a) Discuss the role and deficiency symptoms of potassium.
- b) Explain the active absorption of salts by Lundegardh's theory.
- c) Describe the characteristic features of short day plants.

P.T.O.

Q3) Write short notes on Any two of the following :

[10]

- a) Passive absorption of water.
- b) Ion Antagonism.
- c) Root pressure theory.

Q4) What is Transpiration? Explain the Mechanism of opening and closing of stomata by K. Pump hypothesis.

[10]

OR

What are plant growth Regulators? Explain practical applications of cytokinins.

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Total No. of Questions :4]

[Total No. of Pages : 2

P530

[3717] - 610

S.Y. B.Sc.

ZOOLOGY

**ZO - 221 Animal systematics & diversity
(Old Course) (Paper - I) (Sem. - II)**

Time :2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Attempt the following :

[10]

- a) Enlist any two characters of Petromyzon.
- b) Give the function of scroll valve.
- c) Write the name of soft shelled fresh water reptile.
- d) Name any two cranial nerves of Scoliodon.
- e) Write the name of flying Lizzard.
- f) Mention the function of ampullae of lorenzini.
- g) What is anadromous migration?
- h) What is anapsid skull?
- i) Mention the names of any two poisonous snakes.
- j) Write any two sense organs of Scoliodon.

Q2) Write short notes on (any two)

[10]

- a) Mention systematic position of Scoliodon.
- b) Describe any two types of scales of fishes.
- c) Holobranch in Scoliodon.

P.T.O.

Q3) Attempt the following (any two) :

[10]

- a) Describe physiology of digestion in Scoliodon.
- b) Write the distinguishing characters of poisonous and non-poisonous snakes.
- c) Sketch and label membranous labyrinth in Scoliodon.

Q4) Describe the structure of Scoliodon brain. Add a note on its function. **[10]**

OR

Give an account of parental care in amphibia.

#

Total No. of Questions :4]

[Total No. of Pages : 2

P531

[3717] - 611

S.Y. B.Sc.

ZOOLOGY

**ZO - 222 : Applied Zoology (Apiculture, Sericulture & Vermiculture)
(Old Course) (Paper - II) (Sem. - II)**

Time :2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Attempt the following :

[10]

- a) Define Sericulture.
- b) Write the biological name of Eastern bee.
- c) What is pruning?
- d) What is swarming?
- e) Define non-hibernating eggs.
- f) Mention the use of bee veil.
- g) Write the names of any two species used in vermiculture.
- h) Mention the causative organism of protozoan disease of silkworm.
- i) Name any two enemies of honey bees.
- j) What is stiffling?

Q2) Write short notes on (any two) :

[10]

- a) Tail wagging dance of honey bee.
- b) Economic importance of vermiculture.
- c) Harvesting methods of mulberry leaves.

P.T.O.

Q3) Attempt the following : (any two)

[10]

- a) Describe worker bee.
- b) Any two rearing methods of silkworm.
- c) Describe vermiculture production on small scale.

Q4) Describe in detail any five bee products.

[10]

OR

Describe in detail protozoan and fungal diseases of silkworm.

#####

Total No. of Questions :4]

[Total No. of Pages : 2

P532

[3717] - 612

S.Y. B.Sc.

GEOLOGY

GL - 221 : Petrology

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

Time :2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer the following questions :

[10]

- a) What are metasilicates?
- b) Define extrusive igneous rocks.
- c) Give any two factors controlling soil formation.
- d) Give the name of the rock showing directive texture.
- e) Define fixed phase.
- f) Give the name of 'freezing point curve' in a bicomponent crystallisation magma.
- g) Give the chemical composition of Tschermak's molecule.
- h) Give any two factors controlling grain size of igneous rocks.
- i) Give any two names of products of cataclastic metamorphism.
- j) Give two names of distinct rock types which appear to have been derived from primary magma.

Q2) Write short notes on (any two) :

[10]

- a) Porphyritic texture.
- b) Authigenesis.
- c) Stress and anti stress minerals.

P.T.O.

Q3) Explain the following (any two) :

[10]

- a) Crystallisation of a unicomponent magma.
- b) Rudaceous deposits.
- c) Environmental significance of cross bedding.

Q4) Define metamorphism. Describe the regional metamorphism of Argillaceous rocks.

[10]

OR

Define magma. Explain the role of nature of the magma and molecular concentration in controlling the grain size of igneous rocks.

#

Total No. of Questions :4]

[Total No. of Pages : 2

P533

[3717] - 613

S.Y. B.Sc.

GEOLOGY

GL - 222 PALAEONTOLOGY & STRATIGRAPHY

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

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.*

Q1) Answer the following questions :

[10]

- a) Define Palaeobotany.
- b) What is mummification of plant fossils?
- c) Define a formation.
- d) What is Thermo Remnant Magnetism. (TRM)
- e) What are cyclothem?
- f) Define Biofacies.
- g) What is an Index fossil?
- h) Give the names of male and female carapace in ostracods.
- i) Define palynology.
- j) Define an unconformity.

Q2) Write notes on (any two) :

[10]

- a) Principle of Uniformitarianism.
- b) Cycles as patterned succession.
- c) Palaeontological evidence for correlation.

P.T.O.

Q3) Write notes on (any two) :

[10]

- a) Use of microfossils in palaeo-environment and ecological studies.
- b) Evolutionary trends in eyes of Trilobites.
- c) Types of hinges in ostracods.

Q4) Explain the role of Non-uniform deposition in controlling stratification. **[10]**

OR

Describe the morphology of spores. Add a note on uses of spores and pollens.

#####

P535**[3717] - 615****S.Y. B.Sc.****STATISTICS****ST - 222 : Continuous Probability Distributions - II****(Paper - II) (Old Course) (Sem. - 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 meaning.*

Q1) Attempt each of the following :a) Choose the correct alternative for each of the following : **[1 each]**

- i) Suppose X_1 and X_2 are independent random variates following $N(0, \frac{1}{2})$ distribution and $N(0, 1)$ distribution respectively then probability distribution of $2X_1^2 + X_2^2$ is

- A) $N(3, 5)$ B) χ_2^2
C) $F(1, 2)$ D) cannot be determined

- ii) The statistical test of significance used for testing whether a certain safety programme is effective in improving the average weekly losses of work hours due to accidents after the implementation of safety programme is

- A) F-test B) One sample t-test
C) Two sample t-test D) Paired t-test

- iii) Suppose X and Y are independent and identically distributed

(i. i. d.) $G(2, 2)$ variates, then the distribution of $E\left(\frac{X}{X+Y}\right)$ is

- A) 0.5 B) 2
C) 4 D) 1

P.T.O.

b) State whether following statements are true or false. [1 each]

i) If $X \rightarrow F_{(5, 3)}$ and $Y \rightarrow F_{(3, 5)}$ then $P[X \geq 5] + P\left[Y \geq \frac{1}{5}\right] = 1$.

ii) Statistic is constant while parameter is a random variable.

iii) If X follows t-distribution with 5 degrees of freedom (d.f.) then $E(X) = 5$.

c) State the assumptions of t-test for testing $H_0: \mu_1 = \mu_2$. [1]

d) State the additive property of two independent Chi-square variates. [1]

e) Suppose X_1, X_2, \dots, X_6 are i.i.d. $N(0, 1)$ variates. State giving reasons the distribution of $\frac{X_1^2 + X_2^2 + X_3^2}{X_4^2 + X_5^2 + X_6^2}$. [1]

f) Give one real life situation where paired t-test can be used. [1]

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

a) If X follows $\beta_2(m, n)$ with $m > 1, n > 1$, obtain arithmetic mean and variance of X .

b) Suppose X_1, X_2, \dots, X_8 is a random sample from $N(8, 9)$ distribution, find $E(Y)$ and $\text{Var}(Y)$ if $Y = \sum_{i=1}^8 (X_i - 8)^2$.

c) Describe the test procedure for testing $H_0: \mu = \mu_0$ against $H_1: \mu \neq \mu_0$ for small sample when the population variance, σ^2 is unknown

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

a) If X follows t-distribution with n d.f. then obtain the distribution of X^2 and identify it.

b) A group of 50 men and 60 women was asked to indicate their preference between two brands of perfume. The results are as given below :

	Brand A	Brand B
Men	20	30
Women	10	50

Test the hypothesis that preference for a particular brand of perfume is not related to sex. Use 5% level of significance.

- c) Explain the terms :
- i) Statistic.
 - ii) Sampling distribution of statistic.
 - iii) Standard error of a statistic.

Q4) Attempt any one of the following :

- a) i) If X and Y are independent Chi-square variates with m and n d.f. respectively then show that, $X + Y$ and $\frac{X}{Y}$ are independently distributed. [5]
- ii) Describe the test procedure for testing $H_0 : \sigma_1^2 = \sigma_2^2$ against $H_1 : \sigma_1^2 \neq \sigma_2^2$. [5]
- b) i) Define Snedecor's F-distribution with n_1 and n_2 degrees of freedom and derive its probability density function. [7]
- ii) Suppose X_1, X_2, X_3, X_4, X_5 are i.i.d. $N(0, 4)$ variates, find

$$P\left(\frac{2X_5}{\sqrt{X_1^2 + X_2^2 + X_3^2 + X_4^2}} \geq 1.19\right). \quad [3]$$



Total No. of Questions :4]

[Total No. of Pages : 2

P536

[3717] - 618

S.Y. B.Sc.

MICROBIOLOGY

MB - 221 Growth Physiology and Systematics of Bacteria - II
(Old Course) (Paper - I) (Sem. - II)

Time :2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicates full marks.*
- 3) Draw neat labeled diagram wherever necessary.*

Q1) Answer the following :

[10]

- a) Define fermentation.
- b) Write the chemical reaction of conversion of pyruvic acid to ethanol.
- c) What is substrate level phosphorylation?
- d) Write net gain of ATP formation in Glycolysis.
- e) Define bacterial taxonomy.
- f) Write the principle of Nitrate reduction test.
- g) The second edition of Bergey's manual of systematic bacteriology places procaryotes in to phyla.
- h) Define T_m
- i) Write the formula for % G + c content.
- j) What is dendrogram?

Q2) Attempt any two of the following :

[10]

- a) Describe heterolactic fermentative path way.
- b) Diagrammatically illustrate the interconnectivity of carbohydrate, proteins, lipids and nucleic acids.
- c) Explain the principle and method of indol production and methyl- red test.

P.T.O.

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

- a) Explain any one method for detection of DNA homology.
- b) Explain the principle and method for detection of enzyme gelatinase.
- c) Describe with chemical structure, the E.D Path way.

Q4) Explain in detail the TCA cycle with chemical structures. Add a note on energy yield. **[10]**

OR

What is chemotaxonomy? Elaborate on lipid composition in classification of bacteria.

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Total No. of Questions : 4]

[Total No. of Pages : 2

P537

[3717]-619

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

MICROBIOLOGY

MB - 222 : Bacterial Genetics and Applied Microbiology - II
(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) Draw neat labeled diagrams wherever necessary.*

Q1) All questions are compulsory :

[10]

- a) Define droplet nuclei.
- b) Name any two indicators of faecal pollution.
- c) What is the poresize of a membrane filter?
- d) What is biomagnification?
- e) In titrimetric method of COD determination, organic matter is digested with the help of _____ .
- f) MPN is a _____
 - i) Presumptive test.
 - ii) Confirmed test.
 - iii) Completed test.
 - iv) Eijkman test.
- g) What is the role of a photocell in a colorimeter?
- h) Define 'Ground Water'.
- i) Write any two bacterial airborne pathogens.
- j) Define Total Solids.

P.T.O.

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

- a) Describe any two methods of primary effluent treatment process with suitable diagrams.
- b) Describe principle and working of a centrifuge.
- c) Explain different methods of air impingement.

Q3) Attempt any two : **[10]**

- a) Write a short note on trickling filter.
- b) What is eutrophication? Which factors contributes to it?
- c) How air sanitation is done with the help of chemicals & UV rays.

Q4) Attempt any one : **[10]**

- a) What is BOD? Explain principle, methodology and significance of BOD.
- b) Describe presumptive and confirmed tests used in bacteriological analysis of water.



P538

[3717] - 624

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL - 221 : Circuit Design Principles & Applications - II
(Paper - I) (Old Course) (Sem. - II)

Time :2 Hours]

[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Neat diagrams must be drawn 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) State the classification of Oscillator's based on adjustment of operating point. [1]
- b) Define the term Astable Multivibrator. [1]
- c) What is the Role of Radio frequency coil (RFC) used in oscillator ckt? [1]
- d) Draw the block diagram of Regulated power supply. [1]
- e) The duty cycle of square wave generated by Astable Multivibrator by using IC – 741 is always fifty percent, comment. [2]
- f) Calculate the output voltage of R–2R type DAC for Input DCBA = 1000 and $V_{ref} = 10V$. [2]
- g) When IC – 555 is used as Astable Multivibrator, the external capacitor charges upto $2/3$ of V_{cc} and discharges to $1/3$ of V_{cc} , Comment. [2]
- h) In phase shift oscillator $R = 330 \Omega$ and $C = 0.1 \mu f$. Calculate the frequency of sine wave generated. [2]

Q2) Attempt any two of the following :

- a) Draw the circuit diagram of dual power supply by using Bridge Rectifier and Voltage Regulating IC's. Explain the working of circuit. [4]
- b) State the equation's for T charge and T discharge of capacitor used in IC – 555 as astable multivibrator and derive the equation for frequency. [4]
- c) Draw the circuit diagram of Hartley oscillator and explain the working. [4]

Q3) Attempt any two of the following :

- Draw the circuit diagram to generate the square wave and triangular wave by using OP-AMP IC – 741 without feed back. State the equations for the frequency at the output. [4]
- Draw the Block diagram of single slope ADC and explain the working of circuit. [4]
- Draw the square wave at the out put of Astable Multivibrator of IC – 555 & IC – 741 along with charging and discharging of capacitor. Also indicate the maximum charging voltage and discharging voltage. State the magnitude of HVL & LVL in both case. [4]

Q4) Attempt all of the following :

- Draw the circuit diagram of Monostable Multivibrator using OP – AMP IC – 741 and explain the working at circuit. Also state the equation for pulse width. [6]
- Draw the circuit diagram of Flash ADC for two bit out put and explain the working of circuit. What is the Role of priority encoder in Flash ADC. $R_1 = 10K\Omega, R_2 = 10K\Omega, R = 10K\Omega$ and $C = 0.01 \mu f$. [6]

OR

- Define the term percentage of load Regulation and percentage of line Regulation in connection with power supply. What should be the percentage of load regulation for an Ideal power supply. [4]
- State the advantages and disadvantages of positive and negative feed back, used in oscillator ckt. Sketch the nature of sine wave at the out put of oscillator for $AB < 1$, $AB > 1$ & $AB = 1$. [4]
- Calculate the frequency of astable multivibrator by using OP – AMP IC – 741. Given [4]

####

Total No. of Questions : 4]

[Total No. of Pages : 2

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[3717]-625

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL - 222 : Communication Systems - II

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

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.*

Q1) All subquestions are compulsory :

- a) State the need of a local loop in telephone system. [1]
- b) Why is serial communication preferred over parallel in networking of computers? [1]
- c) State the principle on which light travels in optical fiber. [1]
- d) Define angle of inclination of satellite orbit. [1]
- e) "A geosynchronous satellite revolves around earth in exactly 24 hours"- Comment. [2]
- f) "Curvature of earth limits propagation of space wave"- Comment. [2]
- g) If the number of links are 1225. Find the number of fully connecting telephone subscribers. [2]
- h) Find the rate of transmission of a word if bandwidth of a data transmission channel is 500 Hz. [2]

Q2) Attempt any two of the following :

- a) Explain the concept of star topology. State its advantages and disadvantages. [4]
- b) Explain the important characteristics of picture phone. Describe the picture phone equipment in brief. [4]
- c) Describe the pulse dialing mechanism. What are its disadvantages? [4]

P.T.O.

Q3) Attempt any two of the following :

- a) Explain in brief the different types of optical fibers. [4]
- b) Write a short note on satellite orbits. [4]
- c) What is line of sight propagation? State the co-relation between antenna height and distance of horizon. [4]

Q4) Attempt the following :

- a) Explain with diagrams the concept of ASK, FSK and PSK. [6]
- b) Describe the different tones in telephony. [6]

OR

- a) What is video conferencing? State atleast four applications of video conferencing. [4]
- b) Differentiate between LAN and WAN. [4]
- c) Write a short note on EPABX system. [4]



Total No. of Questions : 4]

[Total No. of Pages : 1

P540

[3717]-626

S.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 221 : International Relations

(Sem. - II) (Old)

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 in 2 or 4 sentences each : **[16]**

- a) Define 'International Relations'.
- b) What is 'International Law'?
- c) Write the role of ICJ.
- d) Write the role of security council.
- e) Define 'Diplomacy'.
- f) Define 'Disarmament'.
- g) When United Nations was established?
- h) Introduce ASEAN.

Q2) Answer in 8 to 10 sentences (any two) : **[8]**

- a) Explain the role of international law in international relations.
- b) Explain the functions of diplomacy.
- c) Discuss the difficulties of disarmament.

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

- a) W.T.O.
- b) Human Rights.
- c) SAARC.

Q4) Answer in 16 to 20 sentences (any one) : **[8]**

- a) Discuss the conceptual difference between old and new diplomacy.
- b) Write an essay on EEC.



Total No. of Questions : 4]

[Total No. of Pages : 2

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[3717]-628

S.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS- 223 : India & Her Neighbours

(Sem. - II) (Old)

Time : 2 Hours]

[Max. Marks : 40

Instructions:

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

Q1) Answer in 2 to 4 sentences:

[16]

- a) Define Geo-strategic perspective.
- b) What do you mean by National Power?
- c) State the meaning of defence preparedness.
- d) Define Foreign policy.
- e) State any two determinants of 'Foreign Policy'.
- f) How you would like to define 'National Interest'.
- g) What do you understand by the term 'Elements of National Power'.
- h) Write full form of SAPTA.

Q2) Answer in 8 to 10 sentences each (any two):

[8]

- a) Explain origin of SAARC.
- b) Discuss Geo-strategic importance of South Asia.
- c) Examine issues in Indo-Bangladesh relations .

P.T.O.

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

- a) Ethnic conflict in Sri-Lanka and India's role in it.
- b) Discuss historical linkages between Indo- Myanmar.
- c) India and Afganistan.

Q4) Explain in 16 to 20 sentences any one: **[8]**

- a) Discuss India's role in SAARC.
- b) Examine security issues in South Asia with special focus on Terrorism.



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[3717]-629

S.Y. B.Sc.

ENVIRONMENTAL SCIENCE

**Environment and Impact of Human Activities on Environment
(Paper - I) (Sem. - II) (Old 2004)**

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) What is carrying capacity?
- b) Enlist a biotic resources (any four).
- c) Define soil erosion.
- d) What is wild life?
- e) Define desertification.
- f) Write effects of over exploitation on physical environment (any two).
- g) What is Traditional Intensive Agriculture?
- h) Define water logging.
- i) Enlist the names of the plants used for mulching (any four).
- j) Write any two causes of over exploitation.

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

- a) Deforestation in India.
- b) Explain the remedial measures of land degradation.
- c) Explain the effects of urbanization on environment.

Q3) Answer any two of the following each in 8-10 lines : **[10]**

- a) Loss of wild life in India.
- b) What is sustainable consumption.
- c) Explain the strategies to reduce overall consumption.

Q4) Answer any one of the following each in 20-22 lines : **[10]**

- a) Describe in detail the impact of man on environment.
- b) Explain Modern Agricultural System in detail.



P545

[3717] - 631

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

OPTIONAL ENGLISH (Old Course)

Text : Indian Prose for Effective Communication

By M. Nagarajan & 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) Choose the right words from the list given below and fill in the blanks.
(Any Four) **[4]**

[practice, ability, acceptance, constitutional, upliftment, dictatorship]

- i) He is working for the..... of the poor.
- ii) Mahesh was selected for his and trustfulness.
- iii) He denied the of my visit to the site.
- iv) His does not match with his preaching.
- v) There is no place for in democracy.
- vi) It is to submit interim budget to the parliament.

b) Match the words in column 'A' with their meanings given in 'B' . **[3]**

A

B

- | | |
|------------------|--|
| i) Rehearsal | a) a part of a story or a play. |
| ii) Inspiring | b) a thing that can be understood or seen. |
| iii) Discernible | c) a background or a scene. |
| iv) Cast | d) that which makes one feel enthusiastic. |
| v) Episode | e) practice before performance. |
| vi) Setting | f) all those who act in a play or a film. |

c) Arrange the following sentences into a coherent paragraph. **[3]**

- i) People feel lost unless they carry some headache remedy.
- ii) At the outset it can be said that headache is essential for maintaining human relationship.
- iii) Opticians also help to give guarantee to relieve headache.

P.T.O.

- iv) Headache has generated huge trade and pharmacists provide remedies.
- v) We cannot do without headache either at home or in public.
- vi) It curtails many uncomfortable situations.

Q2) a) Write a letter of complaint to the Executive Engineer of Electricity Distribution Company of your town about the irregularity of the power supply in your locality and request him to change the schedule for load shedding. **[5]**

OR

Make a précis of the following passage to its one third of length and give a suitable title. (Rough work will be given credit)

Good manners play a significant role in one's life. Learning good manners should be done early in life – it costs nothing – only effort is needed. Good manners attract others. Good manners and courtesy have an impact. They build one's reputation as a person grows up.

A person without good manners remains a beast and is kept at arm's length; a person who is polite and considerate becomes popular. Good manners come from parents; these could also be learnt by following good teachers and elders. Good mannered children bring credit to the family and are welcome everywhere. Children can learn a lot from good schools and good company.

Good manners need to be cultivated. How a child speaks, how it conducts itself, how it respects elders – all these count. A child looks a lot better if it has good manners.

Life stories of great men tell us about geniuses, and how humble and simple they have been. A child with good conduct not only brings credit to the family but also to the school he studies in.

b) Your college organised a workshop on 'N1H1- Awareness about Swine-Flu' for the students and villagers. Write a report of the activities conducted. **[5]**

OR

You have to deliver a lecture on the topic 'Student Discipline: Need of the Time'. Write down main points and sub-points of the lecture in the form of notes.

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

- i) What are Nehru's suggestions to Indira about History?
- ii) Explain the nature of relationship between the Central and the State governments in India.
- iii) What are C. Rajgopalachari's views on the development of Indian literature?
- iv) What was Gandhiji's opinion about M. S. Subbulakshmi?
- v) What are P. N. Bhagawati's views about social justice?
- vi) Write in brief about the interaction between Khushwant Singh and Mother Teresa.
- vii) Give a brief description of Sri Aurobindo Ashram.

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

- i) Explain in brief the three important things suggested by Dr. Ambedkar to maintain democracy.
- ii) What are Swami Vivekananda's views on spiritual, physical and intellectual help?
- iii) What setback did Satyajit Ray receive while shooting Pather Panchali?

#

Total No. of Questions : 4]

[Total No. of Pages : 2

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[3717]-636

S.Y. B.Sc.

BIOTECHNOLOGY

**VOC. Biotech - 221 : Recombinant DNA Technology
(Vocational) (Sem. - II) (Paper - I) (2004 Pattern)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer each of the following in 1-2 lines:

[10]

- a) What are plasmids?
- b) Give two examples of products obtained by using gene cloning.
- c) What is YAC?
- d) What are sticky ends?
- e) What is proteome?
- f) Give two examples of plant viruses used as cloning vectors.
- g) What is ORI site?
- h) What are type-II restriction endonucleases?
- i) What is λ - DNA?
- j) What is pBR 322?

Q2) Write short notes on any two of the following in 8 -10 lines each:

[10]

- a) *Agrobacterium tyme*faciens.
- b) Applications of PCR.
- c) Gene cloning.

P.T.O.

Q3) Attempt any two of the following in 8 -10 lines each: **[10]**

- a) Describe the properties of plasmids as effective cloning vectors.
- b) Describe two vectors used for cloning genes in yeast cells.
- c) Explain in brief DNA modifying enzymes.

Q4) What are cloning vectors? Describe two animal viruses used as cloning vectors. **[10]**

OR

Describe the laboratory requirements for recombinant DNA technology. Add a note on safety measures practiced in such laboratories.



Total No. of Questions : 4]

[Total No. of Pages : 2

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[3717]-638

S.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE - (P-I)

**VOC - EEM - 221: Audio, Video & Office Equipments - B
(Sem. - II) (Paper - I) (Old Course)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidats:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Use of log table and calculator is allowed.*

Q1) Answer the following:

- a) What is DLP? [1]
- b) State one application of light pen. [1]
- c) What is bar code printer? [1]
- d) State one application of CCD array. [1]
- e) Explain the concept of multimedia. [2]
- f) State the difference between optical mouse and opto-mechanical mouse. [2]
- g) What do you mean by memory cache in PC? [2]
- h) What is touch screen? [2]

Q2) Answer any two of the following:

- a) Write a short note on EPABX. [4]
- b) Compare slide projector with OHP. [4]
- c) What are common faults in dot matrix printer? [4]

P.T.O.

Q3) Answer any two of the following:

- a) Explain the construction and working principle of scanner. [4]
- b) Explain the working of FAX machine. [4]
- c) Explain the construction and working of touch screen. [4]

Q4) Answer the following:

- a) Explain the construction and working principle of Xerox machine. [6]
- b) What do you mean by large screen display? Compare the large screen display with CRT display. [6]

OR

- a) Explain the construction and working principle of laser printer. [6]
- b) Explain the functions of mother-board with the help of neat functional diagram. [6]



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[3717]-641

S.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

Vegetable Seed Production

(Paper - III) (Sem. - 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) *Draw neat and labelled diagrams wherever necessary.*

Q1) Attempt the following :

[10 × 1 = 10]

- a) What is selfing?
- b) Define emasculation.
- c) Give any two important roles of introduction in vegetable seed production.
- d) Define artificial seeds.
- e) What type of seed bed used for chillies?
- f) Give any two objectives of vegetable breeding.
- g) Define triple cross hybrids.
- h) Sketch and label the female flower of cucurbits.
- i) What is pure line selection?
- j) Give any two examples of bulbous crops.

Q2) Attempt any two of the following :

[2 × 5 = 10]

- a) Give the classification of vegetable crops.
- b) Define sexual reproduction. Describe the process of fertilization.
- c) What is male sterility? Describe genetic cytoplasmic male sterility.

Q3) Write note on (any two) :

[2 × 5 = 10]

- a) Double cross hybrids.
- b) Self incompatibility.
- c) Requirements for vegetable seed production.

Q4) Describe the stepwise procedure for seed production of tomato.

[10]

OR

Describe in brief hybridization techniques in vegetables.



Total No. of Questions : 4]

[Total No. of Pages : 2

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[3717]-643

S.Y. B.Sc. (Vocational)

BIOTECHNOLOGY

VOC - Biotech - 222 : Immunology & Animal Cell Culture

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

Q1) Answer each of the following in 1-2 lines:

[10]

- a) Define Split ratio.
- b) Phenol red is added in medium Why?
- c) What is mechanical disaggregation of tissue?
- d) Write any two methods of sterilisation used in ATC.
- e) What do you mean by confluence of cell culture?
- f) What is cell mediated immunity?
- g) State the function of IgG.
- h) With example define immunoprecipitation in antigen and antibody.
- i) Which type of cells are involved in antibody production.
- j) What are cytokines?

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

[10]

- a) Importance of serum in medium.
- b) Different subsets of T cells.
- c) Attenuated vaccines.

P.T.O.

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

- a) 'Fibroblast culture initiation includes enzymatic disaggregation'. Explain in detail.
- b) What is transplantation? Explain with suitable example.
- c) Describe the process of phagocytosis.

Q4) What is HAT selection? How it is useful in production of monoclonal antibodies. **[10]**

OR

Describe the classical pathway of complement cascade in detail.



Total No. of Questions : 4]

[Total No. of Pages : 2

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[3717]-645

S.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

**VOC - EEM - 222 : Maintenance Concepts and Repairs - II - B
(Sem.-II) (Paper - II) (Old Course)**

Time : 2 Hours]

[Max. Marks : 40

Instructions:

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

Q1) Answer the following:

- a) Give at least two environmental parameters to be considered while installation. [1]
- b) What is ELCB? [1]
- c) What is installation manual? [1]
- d) What is the impact of preventive maintenance on MTBF? [1]
- e) What is impedance matching? Discuss it with respect to TV and Yagi antenna. [2]
- f) State the effect of static charge on electronic equipment? [2]
- g) What are main electrical hazards? [2]
- h) Explain the concept of 'Artificial earth'. [2]

Q2) Answer any Two:

- a) Describe the installation of TV receiver. [4]
- b) Discuss installation of equipment with reference to electrical hazards. [4]
- c) Write short note on - 'Typical installation manual'. [4]

P.T.O.

Q3) Answer any Two:

- a) Discuss the various safety measures to be taken while installing a service workshop. [4]
- b) With suitable example, describe installation manual of a computer. [4]
- c) Explain the preventive maintenance of a computer. [4]

Q4) Attempt the following:

- a) Explain the importance of artificial earth. Explain the pipe earthing method for having artificial earth. [6]
- b) Discuss the installation plan for an UPS. [6]

OR

- a) Explain the need of artificial earth. Describe the earthing through water mains. [6]
- b) Draw a neat diagram of lead-acid battery. Discuss its preventive maintenance. [6]



Total No. of Questions : 4]

[Total No. of Pages : 1

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[3717]-648

S.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

Seed Quality Control

(Paper - IV) (Sem. - 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) Draw neat and labelled diagrams wherever necessary.*

Q1) Attempt the following :

[10 × 1 = 10]

- a) Define genetic purity.
- b) Give any two advantages of seed sampling.
- c) Define interstate seed certification.
- d) Give any two roles of state seed committee.
- e) What is certified seed?
- f) Give any two roles of field inspector.
- g) State New Seed Policy (1988).
- h) Give two roles of central seed certification board.
- i) Give two advantages of isolation distance.
- j) Enlist any two seed rules.

Q2) Attempt any two of the following :

[2 × 5 = 10]

- a) Describe the objectives of seed legislation.
- b) Explain seed quality with reference to physical purity, and germination.
- c) Describe specifications of different certificates.

Q3) Write notes on any two of the following :

[2 × 5 = 10]

- a) Inspection at harvesting and processing.
- b) Seed Certification Agency.
- c) Duties of Seed Inspector.

Q4) Describe the techniques of field inspection for hybrid cotton seed production.

OR

Give the composition and function of central seed committee.

[10]



P842

[3717] - 637

S.Y. B.Sc.

STILL PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

Colour Photography

(Paper - III) (Sem. - II) (Old Course) (Vocational)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer in short :

[16]

- a) What is the use of a Neutral density filter in colour photography?
- b) What do you mean by the Purkunjé shift?
- c) Explain what happens if a daylight film is exposed to tungsten light.
- d) Explain why safe lights can be used in a B/W darkroom while printing.
- e) Differentiate between a colour negative and a colour positive film.
- f) What is the difference between a colour negative film and colour printing paper?
- g) What do you mean by the CC filters?
- h) Explain what you mean by the colour temperature of a light source.

Q2) Attempt any two of the following :

[8]

- a) Explain why orange mask is provided in a colour film.
- b) Discuss the reasons for using filters in a colour enlarger.
- c) What do you mean by a Mired shift? What is positive and negative Mired shift? How are these corrected?

P.T.O.

Q3) Write short notes on any two of the following : **[8]**

- a) RA-4 process.
- b) Colour vision.
- c) Removal of excess colour from a colour print.

Q4) Attempt any one of the following : **[8]**

- a) Discuss the various stages involved in the processing of a colour negative film.
- b) Draw a labeled diagram and describe the construction of a colour enlarger.



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[3717] - 644

S.Y. B.Sc.

STILL PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

Sound for Media

(Paper - IV) (Sem. - II) (Old Course) (Vocational)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer the following :

[16]

- a) Define signal to noise ratio of a microphone.
- b) Define a sound recording and reproducing system.
- c) Sketch the directional characteristics of a ribbon microphone.
- d) The sensitivity of a microphone is 30dB below 1 volt. Determine its output voltage.
- e) Sketch a diagram of a stereophonic system.
- f) In a magnetic tape recording system, the gap width is 6 microns and the tape speed is 9cm/sec. Determine the highest frequency that can be recorded.
- g) State the characteristics of a HI-FI system.
- h) Compare two characteristics of carbon and crystal microphones.

Q2) Attempt any two of the following :

[8]

- a) Explain the Dolby noise reduction system.
- b) Distinguish between condenser and crystal microphones.
- c) Explain the production of electronic music.

P.T.O.

Q3) Attempt any two of the following : **[8]**

- a) Discuss the working of a moving coil microphone.
- b) Distinguish between stereophonic and monophonic systems.
- c) Explain the function of erase and reproduce heads.

Q4) Attempt any one of the following : **[8]**

- a) Sketch a block diagram of a tape recording system and explain its working.
- b) Write short notes on :
 - i) Surround systems.
 - ii) Characteristics of music.



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[3717] - 616

S.Y. B.Sc.

GEOGRAPHY

Gg-221 : Agricultural Regions and Issues

(Paper - I) (Sem. - 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) 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 is dry farming?
- b) What is crop diversification?
- c) Give full form of ICAR.
- d) What is polyhouse?
- e) Name any two post-harvest processes.
- f) Give any two varieties of poultry birds famous for meat.
- g) Give any two advantages of Vermiculture.
- h) What are biopesticides?
- i) Mention two activities involved in present marketing of agricultural products.
- j) Give any two economic problems of Indian agriculture.

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

- a) Green Revolution in India.
- b) Apiculture.
- c) Role of WTO in agricultural development.

P.T.O.

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

- a) What is the role of Biotechnology in the development of agriculture?
- b) Explain the importance of dairy farming.
- c) Explain the concentric zones suggested by Von Thunen.

Q4) Explain the major agro-climatic zones in India with the help of a map.**[10]**

OR

Describe the different methods of fruit processing.



P861

[3717] - 617

S.Y. B.Sc.

GEOGRAPHY

Gg-222 : Zoogeography

(Sem. - II) (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) 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) Principles of Darwin's theory.
- b) What do you mean by Luminescence?
- c) Define Zoogeographical region.
- d) Define the term migration.
- e) Give two names of poisonous snake species in India.
- f) Name any two national parks in Maharashtra.
- g) Name any two herbivorous mammals in oriental region.
- h) What is meant by metazoa?
- i) Write any two important fish species in Grand Banks fishing ground.
- j) Write any two characteristics of aves.

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

- a) Uses of animals.
- b) Animal characteristics.
- c) Dispersal of reptiles and amphibians.

P.T.O.

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

- a) Explain the environmental adaptation of animals.
- b) Describe Ethiopian Zoogeographical region.
- c) Explain climate as a barrier to animal migration.

Q4) Define Zoogeography. Explain its nature and scope in detail. **[10]**

OR

Explain the role of Government and Non-Government organisations in wildlife conservation.



Total No. of Questions : 4]

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

INDUSTRIAL CHEMISTRY

VOC - 221: Unit Processes in Organic Industries

(Vocational Course) (Paper - I) (25612)

Time : 2 Hours]

[Max. Marks :40

Instructions:

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

Q1) Give balanced equations with conditions for the following reactions / synthesis: **[16]**

- a) Benzene sulphonic acid to benzene.
- b) Benzene \rightarrow Toluene.
- c) Chloro benzene \rightarrow Aniline.
- d) Commercial manufacture of acetic acid.
- e) Acetylene to glyoxal.
- f) Acetanilide \rightarrow p-Nitro acetanilide.
- g) Naphthalene to phthalic anhydride.
- h) Nitrobenzene to azo benzene.

Q2) Attempt any two of the following. **[8]**

- a) Describe the manufacture of m-nitro aniline from m-dinitro benzene.
- b) Discuss the mechanism of nitration of benzene.
- c) Name some oxidizing agents used in synthesis and describe any one of them.

Q3) Write short notes on any two of the following :- **[8]**

- a) Manufacture of phenyl ethyl alcohol.
- b) Discuss the mechanism of sulphonation of benzene.
- c) Synthesis of methanol.

[P.T.O.

Q4) Discuss the physical and chemical factors that affect reduction by acid and metal. [8]

OR

Describe briefly commercial manufacture of benzoic acid from toluene.

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S.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

**VOC-IND-MIC-221 : Microbial Fermentations and
Downstream Processing
(Theory) (Paper - I) (Sem. - II)**

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Answer each subquestion in one or two lines; fill in the blanks; state whether the statement is true or false : **[10]**

- a) Name an agent which could be used as filter aid during filtration process.
- b) Fill in the blank :
‘A low content of _____ enzyme favours glutamate overproduction’.
- c) State whether statement is true or false.
‘Partition coefficient value influences final choice of solvent used for liquid-liquid extraction’.
- d) State whether statement is true or false.
‘Plate & frame filter is an example of batch filter’.
- e) Name the chemical class of Penicillin.
- f) Give an application of amylase.
- g) Name the material used as adsorbent in adsorption chromatography.

P.T.O.

- h) Fill in the blank :
Ethanol is recovered from cell free fermentation broth by _____ method.
- i) Name the metal ion responsible for conversion of all cobalmine to vitamin B₁₂.
- j) Name the flocculating agent added during centrifugation to aid sedimentation of microbial cell.

Q2) Write short note on any two of the following : **[10]**

- a) Rotary vacuum filters.
- b) Precipitation as recovery step of fermentation product.
- c) Semisynthetic penicillin.

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

- a) Enlist the types of centrifuges used for large scale centrifugation. Describe any one in detail.
- b) Justify-why acetic acid production using microorganisms is not a typical fermentation process.
- c) Describe the production of amylase using solid substrate fermentation.

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

- a) Describe different techniques used for cell disruption to lyse cells as one of pretreatment process in downstream processing.
- b) With the help of flow chart, describe the production of vitamin B₁₂ by a fermentation process.



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**S.Y. B.Sc. (Vocational Course)
INDUSTRIAL CHEMISTRY
VOC-222 : Industrial Pollution
(Sem. - II) (Paper - II) (25622)**

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 wherever necessary.*

Q1) Answer the following questions :

[16]

- a) Name the factors which affect BOD measurement.
- b) List four industries which cause air pollution.
- c) Define atmosphere. How is it classified.
- d) Name two types of bacteria in sewage.
- e) Define herbicide with two examples.
- f) Give the ill effects of carbon monoxide to man.
- g) What is meant by Cycle? Name the different cycles in nature.
- h) Define night soil and refuge.

Q2) Attempt any two of the following :

[8]

- a) Describe a method to estimate any two of the following
 - i) DO
 - ii) CN^-
 - iii) Alkalinity
- b) How is sulphur dioxide removed from stack gas?
- c) How is hydrosphere useful to man?

P.T.O.

Q3) Write short notes on any two of the following : **[8]**

- a) Electrostatic precipitators.
- b) Biochemical purification.
- c) Ultra sound irradiation for sterilization.

Q4) Name the sources of air pollution and describe any two in detail. **[8]**

OR

Describe the secondary treatment of waste water.



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S.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

**VOC-IND-MIC-222 : Quality Assurance in Industrial Products
(Theory Paper - II) (Sem. - 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) All questions carry equal marks.***
- 4) Draw neat labeled diagrams wherever necessary.***

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

- a) Define “Quality Control”.
- b) Define “Sterile”.
- c) Define “Undue Toxicity”.
- d) ISO stands for :
 - i) International Service Organization.
 - ii) International Standards Organization.
 - iii) Indian Standards Organization.
 - iv) International Standards Ordinances.
- e) FDA stands for :
 - i) Food and Drug Administrator.
 - ii) Food Development Administration.
 - iii) Foreign Drug Agency.
 - iv) Food and Drug Administration.

P.T.O.

- f) Which of the following bears the FPO mark :
- Jelly sweets.
 - Strikhand.
 - Fruits.
 - Corn flakes.
- g) In the membrane filter technique for sterility checking, the specification of the membrane filter used is :
- 24mm diameter and 0.24µm pore size.
 - 24mm diameter and 0.45µm pore size.
 - 45mm diameter and 0.22µm pore size.
 - 45mm diameter and 0.45µm pore size.
- h) Fill in the blank :
The blood of Limulus Polyphenus is blue due to _____.
- i) Fill in the blank :
The bacterium used in the Ames' Test is a strain of _____.
- j) State whether the following statement is True or False "Allergen testing is not a significant test for injectables".

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

- Explain the test used for detecting the mutagenicity and carcinogenicity of a product.
- Draw a diagram to explain the principle of diffusion in a gel diffusion assay.
- State three reasons why testing for pyrogens using rabbits is better than using the LAL Test, and justify any one reason in detail.

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

- Validation or standardization of a test procedure in Quality Assurance is extremely vital. Justify why this is so, using a suitable example.
- Justify why 'packaged drinking water' may not be 'mineral water'. State any two differences between the two.
- What are 'Pharmacopoeias'? Explain their role in Quality Assurance.

Q4) Attempt any one of the following :

[10]

- a) With a suitable diagram, describe the test for checking the sterility of an intravenous transfusion set.
- b) Enlist the quality assurance tests carried out for a semi-solid preparation such as a hand-moisturizing cream, and explain any two in detail.



Total No. of Questions : 4]

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[3717]-627

S.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS. NO. - 222 : Geostrategy and Military Geography

(Sem. - II) (Old Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions :

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

Q1) Answer in 2 or 4 sentences each.

[16]

- a) Define 'Logistics'.
- b) Why the study of plain warfare is essential for us?
- c) Define strategic Minerals.
- d) State the location of Diego-Garcia.
- e) Write the ideal period for High Altitude warfare.
- f) By which country Natural Gas it was used as a energy resource first time.
- g) To whom we called "Nose of Indian sub-continent"?
- h) State the principles of Logistics.

Q2) Answer in 8 to 10 sentences each. (Any Two)

[8]

- a) Explain in brief Origin of Jungle warfare during World War Second.
- b) Write in brief characteristics of Desert warfare.
- c) Explain the concept of logistics.

Q3) Write short notes on. (Any Two)

[8]

- a) Tactical problems of plain warfare.
- b) Concept of strategic minerals.
- c) Characteristics of High Altitude warfare.

P.T.O.

Q4) Answer in 18 to 20 sentences each. (Any One)

[8]

- a) Assess the role of strategic minerals and resources for Defence preparedness of the country.
- b) Highlight on geostrategic position and importance of Andaman and Nicobar Islands.



Total No. of Questions : 4]

[Total No. of Pages : 2

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[3717]-630

S.Y. B.Sc.

ENVIRONMENTAL SCIENCE

**Effect of changed Environment on Man and Management of
Environment**

(Paper - II) (Sem. - II) (Old - 2004)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

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

Q1) Attempt the following in 1–2 lines each.

[10]

- a) What is conservation?
- b) State any two principles of conservation.
- c) Define 'Protected areas'.
- d) Mention any two important reasons for insufficient public awareness about environment.
- e) Define pollution.
- f) What is plume behaviour?
- g) Define eutrophication.
- h) Mention any two important roles of WWF in Environmental education.
- i) What is ground water pollution?
- j) Enlist any two important strategies for sustainable industrial development.

Q2) Write short notes on any Two of the following.

[10]

- a) Wildlife Sanctuaries and National Parks in India.
- b) People's participation in environmental awareness.
- c) Effects of pollution on biological system.

P.T.O.

Q3) Write any Two of the following. **[10]**

- a) Describe the primary methods of sewage treatment.
- b) Explain the need to improve social awareness for environmental management concerning the agricultural productivity.
- c) What are the atmospheric constituents? Explain the effects of pollution on air quality.

Q4) Attempt any One of the following. **[10]**

- a) Explain the methods to disseminate environmental information among students and general population through various media.
- b) Describe the future energy needs. Explain why we should conserve the energy.

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

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