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P479

[3717] - 201

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

MATHEMATICS

Linear Algebra (New 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) Solve the following questions. [10]

- a) Is the set $\{(1, -1), (2, 1), (3, 0)\}$ linearly dependent? Justify.
- b) Determine whether $W = \{(x, y, z) : x + y + z = 1\}$ is a subspace of $\mathbb{R}^3$.
- c) If $T : \mathbb{R}^2 \rightarrow \mathbb{R}^3$ is a linear transformation such that $T(1, 0) = (2, 1, -1)$ and $T(0, 1) = (1, 1, 0)$, then find $T(2, -1)$.
- d) If u and v are orthogonal vectors in an inner product space, then prove that $\|u + v\|^2 = \|u\|^2 + \|v\|^2$.
- e) Find the orthogonal projection of v along u where $v = (1, -1, 0)$ and $u = (0, 1, -1)$.
- f) Find the eigen values of the matrix $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$.
- g) If $T : \mathbb{R}^3 \rightarrow \mathbb{R}^2$ is given by $T(x, y, z) = (x - y, y - z)$, then find the nullity of T .
- h) Compute the angle between the vectors $(1, 0)$ and $(1, 1)$.
- i) If $S = \{(x, y, z) : 2x - y + z = 0\}$, then find the dimension of S .
- j) Construct an orthonormal basis of $\mathbb{R}^3$ which is not a standard basis.

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

- a) Show that any orthonormal set in an inner product space is linearly independent.
- b) Let $T : \mathbb{R}^2 \rightarrow \mathbb{R}^3$ be defined by $T(x, y) = (x, x + y, y)$. Find the range and kernel of T .
- c) Find a basis of $\mathbb{R}^3$ which contains the vector $(1, 1, 1)$.

P.T.O.

Q3) Attempt any two of the following:

[10]

- a) If $T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ is defined by

$$T(x, y, z) = (x + z, x + y + 2z, 2x + y + 3z),$$

then find $\dim \ker(T)$ and use Rank - Nullity theorem to find $\dim I_m(T)$.

- b) State and prove Cauchy - Schwarz inequality.
c) Find the eigen values and eigen vectors of the matrix

$$\begin{pmatrix} 0 & 2 \\ 2 & 0 \\ 0 & 3 \end{pmatrix}.$$

Q4) Attempt any one of the following:

[10]

- a) i) Apply Gram - Schmidt process to the set $\{(-1, 0, 1), (1, -1, 0), (0, 0, 1)\}$ to obtain an orthonormal basis of $\mathbb{R}^3$.
ii) If $\{e_1, \dots, e_n\}$ is a basis of a vector space V , then show that $\{e_1, \dots, e_n\}$ is a maximal linearly independent set.
b) i) If V and W are finite dimensional vector spaces and $T : V \rightarrow W$ is a linear transformation, then prove that $\dim V = \dim \ker(T) + \dim I_m(T)$.
ii) Show that the reflection matrix.

$$R_\theta = \begin{pmatrix} \cos 2\theta & \sin 2\theta \\ \sin 2\theta & -\cos 2\theta \end{pmatrix} \text{ is diagonalizable.}$$



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[3717] - 202

S.Y. B.Sc.

MATHEMATICS

Paper - II (A) and II (B)

Vector Calculus

(Sem. - II) (New Course) (Paper - II(A)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates :

- 1) All questions are compulsory. (In selected paper).
- 2) Figures to the right indicate full marks.

Q1) Answer the following questions.

[10]

- a) If $\vec{u} = (t^2 - 1)\vec{j} + \cos t \vec{k}$, $\vec{v} = \sin t \vec{i} + e^t \vec{j}$; find $\lim_{t \rightarrow 0} \vec{u} \cdot \vec{v}$.
- b) For the curve $\vec{r}(t) = t\vec{i} + t^2\vec{j} + \frac{2}{3}t^3\vec{k}$, find a unit tangent vector at $t = 1$.
- c) If $\phi(x, y, z) = 2xz^4 - x^2y$ find $-\phi$ at the point $(2, -2, -1)$.
- d) If $\vec{f}(x, y, z) = x\vec{i} + y\vec{j} + z\vec{k}$, find $\frac{\partial \vec{f}}{\partial x}$ using the definition.
- e) Find a if $\vec{u} = (x + 3y)\vec{i} + (y - 2z)\vec{j} + (x + (z))\vec{k}$ is solenoidal.
- f) In what direction from the point $(2, 1, -1)$ is the directional derivative of $\phi(x, y, z) = x^2yz^3$ a maximum? Find the maximum value.
- g) If $\vec{f}(x, y) = \cos xy \vec{i} + (3xy - 2x^2)\vec{j} - (3x + 2y)\vec{k}$, find $\frac{\partial^2 \vec{f}}{\partial x \partial y}$ at the point $(1, 0)$.
- h) If $\vec{u}(t) = t\vec{i} - t^2\vec{j} + (t - 1)\vec{k}$, $\vec{v}(t) = 2t^2\vec{i} + 6t\vec{k}$; evaluate $\int_0^2 \vec{u} \cdot \vec{v} dt$.

P.T.O.

- i) Define - an irrotational vector field.
- j) Using Green's theorem, show that the area bounded by a simple closed curve C is given by, $\frac{1}{2} \oint_C (x dy - y dx)$.

Q2) Attempt any two of the following:

[10]

- a) If $\bar{u}, \bar{v}$ are differentiable functions of t then show that

$$\frac{d}{dt}(\bar{u} \diamond \bar{v}) = \bar{u} \diamond \frac{d\bar{v}}{dt} + \frac{d\bar{u}}{dt} \diamond \bar{v}.$$

- b) Find the equation of the normal plane at $t = 2$ for the curve

$$\bar{r}(t) = 2t^2 \mathbf{i} + (t^2 - 4t) \mathbf{j} + (3t - 5) \mathbf{k}$$

- c) Find the directional derivative of

$$\phi(x, y, z) = xy + yz + zx \text{ at } (1, -1, 1) \text{ along}$$

the line joining the points $(1, 1, 1)$ and $(2, -2, 2)$.

Q3) Attempt any two of the following:

[10]

- a) If $\bar{u}$ and ϕ are respectively vector and scalar functions of x, y, z possessing first order partial derivatives then prove that

$$\text{curl}(\phi \bar{u}) = \text{grad} \phi \times \bar{u} + \phi \text{curl} \bar{u}$$

- b) Find eigen space corresponding to largest eigen value of the matrix.

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

- 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 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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P492

[3717] - 214

S.Y. B.Sc.

STATISTICS

**ST-222: Continuous Probability Distributions - II and Demography
(New 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:

[1]

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

i) Suppose X follows Chi-Square distribution with mode 6 then E(X) is

- | | |
|------|------|
| A) 4 | B) 8 |
| C) 6 | D) 5 |

ii) Let $X_1, X_2, \dots, X_{20}$ be a random sample (r.s.) from $N(25, 80)$ with sample variance S^2 . Then the distribution of $\frac{S^2}{4}$ is

- | | |
|------------------|------------------|
| A) χ^2_4 | B) χ^2_{25} |
| C) χ^2_{19} | D) χ^2_{20} |

iii) Suppose $X_1, X_2, \dots, X_{10}$ is a r.s from normal population with mean μ and known variance σ^2 . Then under $H_0 : \mu = 4$, the statistic

$\frac{\sqrt{10}(\bar{X} - 4)}{\sigma}$ follows:

- | | |
|-------------|----------|
| A) $N(0,1)$ | B) t_9 |
| C) t_{10} | D) t_4 |

P.T.O.

- b) State whether the given statement is true or false in each of the following: [1]
- For t-distribution with n degrees of freedom (d.f.):
Arithmetic mean = median = mode = 0.
 - In a pair t-test, observations in two samples are independent of each other.
 - With usual notations, the formula to estimate the population for intercensal year is $\hat{P}_t = P_0 + (B - D) + (I - E)$.
- c) Define Snedecore's F- distribution with n_1 and n_2 d.f. [1]
- d) Define Chi-Square distribution. [1]
- e) Give one real life situation where Chi-Square test can be used. [1]
- f) Define gross reproduction rate (G.R.R.). [1]

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

- State and prove additive property of Chi-Square distribution.
- Describe test procedure for testing $H_0 : \sigma_1^2 = \sigma_2^2$ against $H_1 : \sigma_1^2 \neq \sigma_2^2$ where σ_1^2 and σ_2^2 are the variances of two populations. State the underlying assumptions.
- Define crude death rate (C.D.R.) and age specific death rate (A.S.D.R.). Find the C.D.R. in terms of A.S.D.R. Also state one application of C.D.R.

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

- Explain the term sampling distribution of a statistic. Also obtain the sampling distribution of sample mean of a r.s. of size 'n' drawn from exponential distribution with parameter α .
- Let X follows t-distribution with 'n' d. f. Find $(2r)^{th}$ central moment of X.
- In a departmental examination, the result of candidates of both the genders is as presented in following table:

Gender	Pass	Fail
Male	40	60
Female	70	60

Do the data support the claim that the result of the test is associated with gender of the candidate? (Use 5% level of significance.)

Q4) Attempt any one of the following :

- a) i) Explain the small sample test for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu \neq \mu_0$, when σ^2 is unknown. Also state $100(1-\alpha)\%$ confidence interval for population mean (μ) when σ^2 is unknown. [7]
- ii) if X_1 and X_2 are independent and identically distributed $N(4, 1)$ variates, find $P(0.296 < (X_1 - X_2)^2 < 0.910)$. [3]
- b) i) If $X \rightarrow F_{n_1, n_2}$ and $Y \rightarrow F_{n_2, n_1}$ then show that $P(X \geq a) + P\left(Y \geq \frac{1}{a}\right) = 1$. Also, if $X \rightarrow F_{3,6}$ and $Y \rightarrow F_{6,3}$, find the value of $P(X \leq 10) + P(Y \leq 0.1)$. [5]
- ii) Compute total fertility rate for the following data: [5]

Age group	Number of women	Number of births
15- 20	24,000	800
20-25	20,000	2400
25-30	15,000	2000
30-35	12,000	600
35-40	6,000	120
40-45	4,000	10



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P695

[3717] - 240

S.Y. B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Microprocessor and Interfacing Techniques - II

(Paper - I) (58712) (Sem. - II) (New 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 x 1 = 4]

- i) Write any one important function of BIOS.
- ii) List different types of commonly used Printers.
- iii) Write the full form of MIDI.
- iv) Optical disks are known by which other popular name.

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

- i) Draw the bit format used for Asynchronous serial data transmission.
- ii) Describe Multimedia - PC in very brief.
- iii) List wireless communication standards you know.
- iv) Classify networks on the basis of area covered.

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

- a) Describe the features of Bluetooth Wireless Communication standard.
- b) Describe Thick and Thin Concept with reference to a Green PC.
- c) Explain how can the performance of devices and interfaces be enhanced?

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

- a) Explain different types of Scanners and their typical uses.
- b) List newer types of storage devices that are commonly used. Describe their typical features.
- c) Describe the working of a Device Controller with the help of a block diagram.

P.T.O.

Q4) Attempt any two of the following :

[2 x 6 = 12]

- a) Explain the concept of speech synthesis along with its typical applications.
- b) Explain the function of a Display Adaptor. Write important features of any two display adapters which are commonly used.
- c) Explain the methods and standards used for serial data communication in detail.



Total No. of Questions : 4]

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P696

[3717] - 247

S.Y. B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Computer System Management - II

(Paper - II) (New Course) (58722) (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) a) Attempt the following : [4 x 1 = 4]

- i) What is a Hardware?
- ii) Define Operating System.
- iii) RDBMS stands for.
- iv) What is a PDA?

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

- i) What is a Modem? Give its one use.
- ii) What is a USB? Give its one use.
- iii) Give two applications of flash memory devices.
- iv) List any two utility softwares. State their uses.

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

- a) Give installing procedure for a Linux Desktop.
- b) List various hardware component required for a Desktop P.C.
- c) What is Segregation of Duties?

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

- a) Explain the uses of :
 - i) Mouse.
 - ii) Wi-Fi Devices.
 - iii) Interface Dongles.
 - iv) Web Camera.

P.T.O.

- b) How Storage Media are disposed?
- c) Explain importance of Maintenance Controls.

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

- a) How Operation Management play an important role in Network Resources Sharing?
- b) Explain importance of change process.
- c) Define Operating System. What is a device driver? Give two examples of application softwares & explain their uses.



P481**[3717] - 203****S.Y. B.Sc.****PHYSICS****PH - 221 : Oscillations, Waves and Sound****(Paper - I) (Sem. - II) (New 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 tables allowed.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt all of the following :

- a) Explain stable equilibrium. [1]
- b) What is meant by overdamped motion? [1]
- c) What is a resonance? State the condition for amplitude resonance. [1]
- d) Explain transverse waves in brief. [1]
- e) What is red shift? [1]
- f) Explain the quality of a sound. [1]
- g) An oscillator of mass 0.02kg oscillating with the amplitude 0.1m and frequency 50Hz. What is its energy? [1]
- h) The equation of motion in the critically damped motion is given in the form $3\frac{d^2x}{dt^2} + 24\frac{dx}{dt} + kx = 0$ find the value of k. [1]
- i) What are coupled oscillations? [1]
- j) The velocity of transverse waves over a stretched string is 100 cm/s. If its mass per unit length is 5 g/cm, find tension in the string. [1]

Q2) Attempt any two of the following :

- a) Derive the condition for velocity resonance and obtain amplitude of velocity at resonance. [5]
- b) Show that average energy of oscillator in damped oscillations is

$$\bar{E} = \frac{1}{2}ka^2e^{-R_0/m} \quad [5]$$

- c) Describe Rayleigh disc method to determine intensity level of sound. [5]

P.T.O.

Q3) Attempt any two of the following :

- a) A particle is moving simple harmonically along a straight line. If it possesses velocities v_1 and v_2 at positions x_1 and x_2 from the equilibrium

position, prove that the periodic time is $T = 2\pi \sqrt{\frac{x_2^2 - x_1^2}{v_1^2 - v_2^2}}$ [5]

- b) The equations of forced oscillations of an oscillator is given by

$$4 \frac{d^2x}{dt^2} + 3 \frac{dx}{dt} + 64x = 60 \sin 4t$$

Determine the amplitude and phase difference between the periodic force and the displacement in CGS units. [5]

- c) Calculate the energy density and intensity of a plane progressive wave of frequency 300Hz, of amplitude 0.07 cm and velocity 33000 cm/s. The density of the medium is $1.293 \times 10^{-3} \text{g/cm}^3$. [5]

Q4) Attempt the following :

- a) i) Define linear simple harmonic motion and obtain equation of motion for SHM. [4]
ii) Show that Doppler effect in light is symmetric. [4]

OR

- i) What do you mean by wave velocity and particle velocity? Show that wave velocity is given by $c = \frac{w}{k}$. [4]
ii) Show that in damped oscillatory motion the displacement is $x = ae^{-Rt/2m} \sin(pt + \theta)$. [4]
- b) Attempt any one of the following :
- i) A spectral line of wavelength $5890\text{\AA}$ in the spectrum of star is found to be displaced by $1.178\text{\AA}$ from its normal position towards the red end of the spectrum. Determine the velocity of the star. [2]
ii) The volume of the space in a hall is 1350 m^3 . The total surface area of the absorbers present is 135m^2 (in open window units). Determine the reverberation time for the hall. [2]



P482

[3717] - 204

S.Y. B.Sc.

PHYSICS

PH - 222 : Optics

(Paper - II) (Sem. - II) (New)

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) Define the terms, optical centre and principal focus of a convex lens. [1]
- b) State the cause of chromatic aberration. [1]
- c) Define angular magnification of a telescope. [1]
- d) What is diffraction of light? [1]
- e) State Malus law. [1]
- f) Two thin convex lenses each of focal length 20 cm are placed in contact. Find power of combination of lenses. [1]
- g) What do you mean by cardinal points? [1]
- h) A converging lens of power 25D is used as a simple microscope. Calculate the magnifying power, if the distance of distinct vision is 25cm. [1]
- i) What is meant by resolving power of an optical instrument? [1]
- j) Glass plate is to be used as a polarizer. Find the angle of polarization for it. (μ for glass = 1.54). [1]

Q2) Attempt any two of the following :

- a) Explain the construction and working of an astronomical telescope. Derive the expression for its magnifying power in normal adjustment. [5]
- b) Explain the stokes treatment of the phase change on reflection of light. [5]
- c) Explain Brewster's law and describe how it can be used to produce the plane polarized light. [5]

P.T.O.

Q3) Attempt any two of the following :

- a) The focal length of each lens of Ramsden's eye-piece is 4cm. Calculate the equivalent focal length of eye-piece and locate the positions of cardinal points. [5]
- b) A soap film of refractive index 1 and of thickness $1.5 \times 10^{-6}\text{m}$ is illuminated by white light incident at an angle of 30° . The light reflected by it is examined by spectrometer in which is found a dark band corresponding to wavelength of $5 \times 10^{-7}\text{m}$. Calculate the order of interference bands. [5]
- c) Unpolarized light falls on two polarizing sheets placed one on top of other. What must be the angle between the characteristic directions of the sheet if intensity of transmitted light is one fourth intensity of the incident beam? [5]

Q4) Attempt the following :

- a) i) Derive the len's maker's formula for a thin len's. [4]
- ii) Show that longitudinal chromatic aberration is equal to the product of dispersive power and mean focal length. [4]

OR

- i) Explain principal foci and focal planes. Draw necessary ray diagram. [4]
- ii) Explain how spherical aberration is reduced using plano convex lens. [4]
- b) Attempt any one of the following :
 - i) Distinguish between fresnel's and Fraunhofer's diffraction. [2]
 - ii) Monochromatic light of wavelength $6000\text{\AA}$ is incident normally on a diffraction grating. The first order maximum is observed in the direction of $15'$. Calculate the grating element. [2]



P483

[3717] - 205

S.Y. B.Sc.

CHEMISTRY - I

CH : 221 Inorganic Chemistry

(New 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) Neat diagrams must be drawn wherever necessary.

Q1) Attempt the following :

[10]

- a) What is gangue?
- b) When Bayer's process is used?
- c) Name products of Blast Furnace.
- d) Draw structure of B_2H_6 .
- e) Minamata incident is due to which metal ion.
- f) What are conjugate acid-base pair?
- g) Why transition metal forms complexes?
- h) What is corrosion?
- i) Why $HClO_4$ is stronger acid than $HClO_3$?
- j) Explain term diamagnetism.

Q2) Attempt any two of the following :

[10]

- a) Write the names, symbols and electronic configurations of III_A group and Explain trends in the following properties of these element.
 - i) Size of Atoms.
 - ii) Oxidation State.
- b) Explain concept of Acid-Base according to Lux-Flood concept with suitable examples.
- c) Answer the following :
 - i) Explain the process of concentration of ore by leaching process.
 - ii) Explain biochemical effect of Cadmium.

P.T.O.

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

- a) What are a block elements? Show their position in the periodic table. Explain following properties.
 - i) Size of atoms and ions.
 - ii) Colour.
- b) Describe construction and working of electrolytic cell used for extraction of Aluminium.
- c) What is passivity? Explain oxide film theory with evidences.

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

- i) Explain with diagram L.D process of making steel. What are its advantage?
- ii) Sketch neat labelled diagram of Blast Furnace. Give working of blast furnace.

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

- i) What is anomalous behaviour? Explain with reference to oxygen.
- ii) Explain with suitable example concept of Hard & Soft acid base.
- iii) Give any two factors affecting rate of immersed corrosion.

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P484

[3717] - 206

S.Y. B.Sc.

CHEMISTRY

**CH - 222 : Analytical Chemistry
(51322) (Sem. - II) (New 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 logarithmic tables and calculator is allowed.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following :

[10]

- a) Distinguish between dry ashing and wet ashing.
- b) Concentrated HCl can not be used in place of dilute HCl as a group reagent for group I. Why?
- c) What is a functional group?
- d) Define 'Equivalence point' in volumetric analysis.
- e) What are the disadvantages of starch indicator?
- f) Define the term standard deviation.
- g) How is Tollen's reagent prepared?
- h) Which is a group reagent for III B group?
- i) Give any two advantages of solvent extraction.
- j) Why should a primary standard substance have a high molecular weight?

Q2) a) Answer any two of the following :

[6]

- i) Explain applications of solvent extraction.
 - ii) Write a note on borate removal scheme in qualitative analysis.
 - iii) Explain the method of estimation of copper in crystallised copper sulphate.
- b) 0.450 gm of an organic compound gave 0.5 gm of silver chloride in a carius estimation. Find the percentage of chloride in the compound.[4]

P.T.O.

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

- i) What is a displacement titration? Illustrate it with a suitable example.
- ii) Give the classification of errors with suitable examples.
- iii) How is phenol detected? Give two characteristic tests for phenolic-OH group.

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

- i) The percentage of sulphur in an organic compound was found by four different students as 10.10, 10.30, 10.40, and 10.50. Calculate the mean deviation, standard deviation and relative mean deviation.
- ii) In solvent extraction of a metal using ether, the volume of aqueous and organic phase was 30 ml each. When the percentage extraction was 98%; calculate the distribution ratio.

Q4) a) Explain the titration curve of strong acid and strong base. Which indicator will you choose for this titration? [6]

OR

Explain Duma's method of nitrogen estimation with labelled diagram.

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

- i) Describe the Mohr's method for estimation of chloride in a given sample.
- ii) What is solubility product? Explain one application of it in qualitative analysis.

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P485

[3717] - 207

S.Y. B.Sc.

BOTANY

BO : 221 Structural Botany

(Anatomy, Embryology and Palynology)

(New Course) (Paper - I) (Sem. - II) (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) *Draw neat and labelled diagrams wherever necessary.*

Q1) Attempt the following

[10]

- a) Define anatomy.
- b) What is anomalous secondary growth?
- c) Write any two functions of collenchyma.
- d) What is principle of incompressibility?
- e) Define amoeboid type of tapetum.
- f) Write any two significances of double fertilization.
- g) What is the function of endothecium?
- h) What is experimental embryology?
- i) Define paleopalynology.
- j) What is proximal pole of pollen grain?

Q2) Answer any two of the following :

[10]

- a) What are glandular hairs? Give their types with suitable examples.
- b) Explain the mechanical tissues and their distribution in dicot stem.
- c) Give the applications of palynology in apiculture.

P.T.O.

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

[10]

- a) Helobial endosperm.
- b) Different types of microspore tetrads.
- c) NPC system of classification of pollen grains.

Q4) Define normal secondary growth, and briefly explain the process in annual dicot stem. **[10]**

OR

What is megasporogenesis? Describe the structure of typical embryo sac.

#

Total No. of Questions :4]

[Total No. of Pages : 2

P486

[3717] - 208

S.Y. B.Sc.

BOTANY

**BO : 222 Fundamentals of Plant Biotechnology
(New 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 labelled diagrams wherever necessary.*

Q1) Attempt the following

[10]

- a) Define Biotechnology.
- b) Give different types of Genome.
- c) What are GMOs?
- d) Define bioreactor.
- e) What is immobilization?
- f) What are petroplants?
- g) Name any two algal sources of SCP.
- h) What is embryogenesis?
- i) Give any two applications of plant tissueculture.
- j) What is environmental sustainability?

Q2) Answer any two of the following :

[10]

- a) Describe the various substrates used in biotechnology.
- b) Give the advantages of biofuels.
- c) Write a brief note on social and moral aspects of genetic engineering.

P.T.O.

Q3) Write short notes : (any two)

[10]

- a) Applications of enzymes.
- b) Stirred tank bioreactor.
- c) Advantages and disadvantages of SCP.

Q4) Describe the process of semiconservative replication of DNA with the help of suitable diagram. **[10]**

OR

Describe the design and set up of a tissue culture laboratory. **[10]**

#####

Total No. of Questions :4]

[Total No. of Pages : 2

P487

[3717] - 209

S.Y. B.Sc.

ZOOLOGY

**ZY - 221 : General Zoology and Biological Techniques - II
(New Course) (Paper - I) (Sem. - II)(2008 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) *Neat labelled diagrams must be drawn wherever necessary.*

Q1) Attempt the following :

[10]

- a) Write the names of any two eyeball muscles of Scoliodon.
- b) What is altitudinal migration?
- c) What is the function of ampullae of Lorenzini of Scoliodon.
- d) Write any two examples of birds with perching feet.
- e) Explain Bioinformatics.
- f) Name the organ of equilibrium and hearing of Scoliodon.
- g) What is spatulate beak?
- h) Write the biological name of dog fish.
- i) Define mole.
- j) Enlist any two methods of dating of fossils.

Q2) Write short notes on (any two) :

[10]

- a) Significance of haemoglobin percentage.
- b) Parental care in Pipa.
- c) Structure of heart of Scoliodon.

P.T.O.

Q3) Attempt the following : (any two)

[10]

- a) Explain Ganoid scale.
- b) Sketch and label dorsal view of brain of Scoliodon.
- c) Explain principle of phase contrast microscope.

Q4) Describe the male urinogenital system of Scoliodon.

[10]

OR

Describe the preparation of any four stains you have studied.

#

Total No. of Questions :4]

[Total No. of Pages : 2

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[3717] - 210

S.Y. B.Sc.

ZOOLOGY

**ZY : 222 Applied Zoology - II (Apiculture & Sericulture)
(New Course) (Paper - II) (Sem. - II)(2008 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) *Neat labelled diagrams must be drawn wherever necessary.*

Q1) Attempt the following :

[10]

- a) What is hive?
- b) Enlist any two varieties of silk.
- c) What is absconding?
- d) What is non hibernating eggs?
- e) Define the term bivoltine.
- f) What is the role of Royal jelly?
- g) Define pruning.
- h) Enlist any two bee pests.
- i) What is deflossing?
- j) Enlist any two viral diseases in silkworm.

Q2) Write short notes on (any two) :

[10]

- a) Honey bee queen.
- b) Stiffling & sorting of cocoons.
- c) Honey extractor.

P.T.O.

Q3) Attempt the following : (any two)

[10]

- a) Explain the economic importance of honey.
- b) Sketch and label salivary glands of silkworm.
- c) Explain different bed cleaning methods.

Q4) Give an account of communication of honey bees.

[10]

OR

What is harvesting? Describe different methods of harvesting of mulberry leaves.

#

Total No. of Questions :4]

[Total No. of Pages : 2

P489

[3717] - 211

S.Y. B.Sc.

GEOLOGY

GL - 221 PETROLOGY

(New 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) Define primary magma.
- b) Define competence of transporting medium.
- c) Define metasomatism.
- d) What is dolerite?
- e) Define sphericity of the sediments.
- f) What is xenoblastic texture?
- g) Name any two minerals of low-silication.
- h) Define thermal metamorphism.
- i) What is authigenesis?
- j) What is directive texture?

Q2) Write notes on (any two) :

[10]

- a) Modes of mechanical transportation.
- b) Perlitic cracks and expansion cracks.
- c) What are Argillaceous rocks? Describe shale deposits.

P.T.O.

Q3) Explain the following : (any two)

[10]

- a) Niggli's molecules.
- b) Origin and environmental significance of ripple marks.
- c) Stress and Anti- stress minerals.

Q4) Define texture. Describe the factors controlling the textures of Igneous rocks.

[10]

OR

Define cataclasis. Describe the products of cataclasis.

#

P507

[3717]-231

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

मराठी (Marathi)

व्यावहारिक मराठी

(नवा व जुना अभ्यासक्रम)

वेळ : 2 तास]

[एकूण गुण : 40

सूचना :- 1) सर्व प्रश्न अनिवार्य आहेत.

2) उजवीकडील अंक प्रश्नांचे पूर्ण गुण दर्शवितात.

प्रश्न 1) अ) पुढील उताऱ्याचे मराठीत भाषांतर करा.

[8]

The spiritual training of the boys was a much more difficult matter than their physical and mental training. I relied little on religious books for the training of the spirit. Of course I believed that every student should be acquainted with the elements of his own religion and have a general knowledge of his own scriptures, and therefore I provided for such knowledge as best I could. But that, to my mind, was part of the intellectual training. Long before I undertook the education of the youngsters of the Tolstoy Farm. I had realized that the training of the spirit was a thing by itself. To develop the spirit is to build character and to enable one to work towards a knowledge of God and self-realization. And I held that this was an essential part of the training of the young and that all training without culture of the spirit was of no use, and might be even harmful.

P.T.O.

ब) पुढील उताऱ्याचा शीर्षकासह एक तृतीयांश सारांश लिहा. [7]

प्रत्येक नवी वस्तू तयार करताना माणसाच्या मनाची नवी रचना आकाराला येत असते. यालाच आपण माणसाच्या मनुष्यत्वाचा विकास असे म्हणतो. माणूस आपल्या भोवतालची परिस्थिती जशी आहे त्या स्वरूपात न स्वीकारता तिच्यामध्ये सतत बदल करीत आलेला आहे, तिची पुनर्रचना करीत आलेला आहे. आणि असा बदल करताना, पुनर्रचना करताना स्वतः बदलत गेला आहे, स्वतःला रचीत गेला आहे. एक नवी वस्तू प्रत्यक्षात आणण्याची, आपल्या परिस्थितीची पुनर्रचना करण्याची आणि त्याबरोबर स्वतःला नव्याने रचण्याची कृती ही माणसाला सतत आनंददायक वाटत आलेली आहे. या आनंदात परिस्थितीच्या पलीकडे जाण्याचा, तिच्या मर्यादा, बंधने ओलांडण्याचा भाग जसा बराच असतो, त्याप्रमाणे स्वतःच्या मर्यादा ओलांडून पलीकडे जाण्याचा, स्वतःचीच नवी ओळख करून घेण्याचा भागही मोठा असतो. अमुक एक वस्तू निर्माण करेपर्यंत ती गोष्ट निर्माण करण्याची कुवत आपल्यात होती हे माणसाला आधी कळत नाही. तिची जाणीव ती कृती करताना होते. हीच माणसाला स्वतःचीच होणारी ओळख होय. निर्मितीची क्षेत्रे विज्ञान, तंत्रज्ञान, तत्त्वज्ञान इ. अनेक असली तरी अशी ओळख कलावंताला कलानिर्मितीमध्ये सर्वात अधिक होते. याचे कारण विज्ञान, तंत्रज्ञान आणि तत्त्वज्ञानामध्ये केवळ बुद्धीच्या व्यापाराला जसे महत्त्व असते तसे कलानिर्मितीमध्ये घडत नाही. कलानिर्मितीमध्ये मनाच्या सगळ्या शक्ती क्रियाशील होतात. त्यामुळे त्या निर्मितीतील आनंदही अधिक आहे. आज निर्मितीच्या आनंदाला माणूस पारखा होत चालला आहे. विज्ञान आणि तंत्रज्ञानाने माणसाला यंत्राचा एक भाग बनविले आहे. यंत्रातून तयार झालेली वस्तू कितीही सुंदर असली तरी माणसाला ही माझी निर्मिती आहे असे म्हणता येत नाही.

(शब्द संख्या - २०८)

प्रश्न 2) पुढीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा. [15]

- अ) 'स्वच्छ पाणी आणि आरोग्य' या विषयावर वर्तमानपत्रासाठी 300 शब्दांत लेख लिहा.
- ब) 'तंत्रज्ञानाने केलेली क्रांती' या विषयावर आकाशवाणीसाठी 300 शब्दांचे भाषण तयार करा.
- क) 'अंधश्रद्धा आणि ग्रामीण समाज' या विषयावर दूरदर्शनसाठी लघुपट तयार करावयाचा आहे. संहिता लेखन करा. लघुपट कालावधी - 5 मिनिटे.

प्रश्न 3) खालील पारिभाषिक शब्दांना मराठी प्रतिशब्द लिहा. [10]

- | | |
|-----------------|--------------------|
| 1. Physiology | 2. Entomology |
| 3. Anatomy | 4. Calories |
| 5. Cardiologist | 6. Dermatology |
| 7. Amnesia | 8. Herbal |
| 9. Blood-Cell | 10. Blood pressure |

□□□□

P838

[3717] - 238

S.Y. B.Sc.

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

Colour Photography

(Paper - III) (Sem. - II) (New 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) How are the polarizing filters useful in colour photography?
- b) Draw the colour sensitivity curve of a normal human eye and explain it.
- c) The colour temperature of daylight film is 5500 Kelvin. What does it mean?
- d) Colour temperature of certain light source is 12000 Kelvin. Convert it to mired.
- e) Differentiate between a colour negative and a colour positive film.
- f) What is the function of the yellow filter in a colour film?
- g) A colour filter is designated as 40 CC Y what does it mean.
- 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) Calculate the mired shift between the daylight film (5500 K) and the tungsten light source (3500 K). Which filter is useful in this situation.

P.T.O.

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

- a) Processing a colour reversal film.
- b) Colour vision.
- c) Removal of excess colour from a colour print.

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

- a) Draw suitable diagrams and explain 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.



P839

[3717] - 245

S.Y. B.Sc.

STILL PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION
Principles and Applications of Analog and Digital Communications
(Paper - IV) (Sem. - II) (New 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) Solve following questions :

- a) Attempt following multiple-choice questions : **[2]**
 - i) RF current is converted into Electromagnetic waves and Electromagnetic wave is converted into RF current using.....
A) Antenna B) Transmitter
C) Receiver D) Amplifier
 - ii) For picture signal transmission.....modulation is used
A) Vestigial side band B) Amplitude
C) Frequency D) Phase
- b) Comment on the following statements (any two) : **[4]**
 - i) Need of modulations and comment on how to avoid of mixing of signals.
 - ii) Power requirement for SSB and DSB generation.
 - iii) FM is not used for picture transmission.
- c) Solve following Numerical or explain : **[6]**
 - i) Consider the analog signal $x(t) = 2\sin 50\pi t + 5\sin 500\pi t - \cos 100\pi t$, Find maximum frequency present in $x(t)$ and Nyquist rate for this signal.
 - ii) Compare analog pulse modulation with digital pulse modulation.
 - iii) Explain importance of Nyquist criteria.

P.T.O.

Q2) Explain the following (any two) : **[8]**

- a) Draw basic block diagram of analog communication system and explain.
- b) Explain Filter method for SSB generator.
- c) What is Data transmission and explain any one method in short.

Q3) Explain the following (any two) : **[8]**

- a) Write a short note on PCM.
- b) Explain FDM with the help of block diagram.
- c) Draw frequency spectrums of DSBFC and DSBSC.

Q4) Solve following numericals (any two) : **[12]**

- a) A modulating signal $10 \sin(2\pi \times 10^3 t)$ is used to modulate a carrier signal $20 \sin(2\pi \times 10^4 t)$. Find percentage of modulation, side band frequencies, bandwidth and amplitudes of sidebands.
- b) Draw block diagram of digital communication system and explain in details.
- c) The output voltage of transmitter is given by $500(1 + 0.4\sin 3140t) \sin 6.28 \times 10^7 t$ this voltage is fed to a load of 600Ω . Determine Carrier frequency, modulating frequency, carrier power and Mean power output.



Total No. of Questions : 4]

[Total No. of Pages : 2

P480

[3717]-202

S.Y. B.Sc.

MATHEMATICS

Paper - II (A) : Vector Calculus

(Sem. - II) (New Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions :

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

Q1) Answer the following questions :

[10]

- a) If $\vec{u} = (t^2 - 1)\vec{j} + \cos t \vec{k}$, $\vec{v} = \sin t \vec{i} + e^t \vec{j}$; Find $\lim_{t \rightarrow 0} \vec{u} \times \vec{v}$.
- b) For the curve $\vec{r}(t) = t\vec{i} + t^2\vec{j} + \frac{2}{3}t^3\vec{k}$, find a unit tangent vector at $t = 1$.
- c) If $\phi(x, y, z) = 2xz^4 - x^2y$, find $\nabla\phi$ at the point $(2, -2, -1)$.
- d) If $\phi(x, y, z) = x^2yz^3j + zk$, find $\frac{\partial \phi}{\partial x}$ using the definition.
- e) Find α if $\vec{u} = (x + 3y)\vec{i} + (y - 2z)\vec{j} + (x + \alpha z)\vec{k}$ is solenoidal.
- f) In what direction from the point $(2, 1, -1)$ is the directional derivative of ϕ a maximum? Find the maximum value.
- g) If $\vec{f}(x, y) = \cos xy \vec{i} + (3xy - 2x^2)\vec{j} - (3x + 2y)\vec{k}$, find $\frac{\partial^2 \vec{f}}{\partial x \partial y}$ at the point $(1, 0)$.
- h) If $\vec{u}(t) = t\vec{i} - t^2\vec{j} + (t - 1)\vec{k}$, $\vec{v}(t) = 2t^2\vec{i} + 6t\vec{k}$;
evaluate $\int_0^2 \vec{u} \cdot \vec{v} dt$.
- i) Define – an irrotational vector field.
- j) Using Green's theorem, show that the area bounded by a simple closed curve C is given by, $\frac{1}{2} \oint_C x dy - y dx$.

P.T.O.

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

- If $\bar{u}, \bar{v}$ are differentiable functions of t then show that
- Find the equation of the normal plane at $t = 2$ for the curve $\bar{r}(t) = 2t^2\bar{i} + (t^2 - 4t)\bar{j} + (3t - 5)\bar{k}$.
- Find the directional derivative of $\phi(x, y, z) = xy + yz + zx$ at $(1, -1, 1)$ along the line joining the points $(1, 1, 1)$ and $(2, -2, 2)$.

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

- If $\bar{u}$ and ϕ are respectively vector and scalar functions of x, y, z possessing first order partial derivatives then prove that $\text{curl}(\phi\bar{u}) = \text{grad } \phi \times \bar{u} + \phi \text{curl } \bar{u}$.
- If $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}, r = |\bar{r}|$, find $\text{grad } r^n$. Hence or otherwise find $\nabla\left(\frac{1}{r}\right)$.
- Find the scalar potential ϕ if

$$\frac{d}{dt}(\phi\bar{v}) = \left(\frac{x}{u} + \frac{2y}{u} + \frac{4z}{u}\right)\bar{i} + (2x - 3y - z)\bar{j} + (4x - y + 2z)\bar{k}$$

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

- State and prove Green's theorem in plane.
- Evaluate $\iint_S (x^2\bar{i} + y^2\bar{j} + z^2\bar{k}) \cdot \bar{n} ds$ where S is the surface of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.
 - Evaluate $\oint_C \bar{f} \cdot d\bar{r}$ by using Stoke's theorem, where $\bar{f} = xy\bar{i} + xy^2\bar{j}$ taken round the square C with vertices $(1, 0), (-1, 0), (0, 1), (0, -1)$.

□□□□

Total No. of Questions : 4]

[Total No. of Pages : 4

P480

[3717]-202

S.Y. B.Sc.

MATHEMATICS

Paper - II (B) : Discrete Mathematics

(Sem. - II) (New Course)

Time : 2 Hours]

[Max. Marks : 40

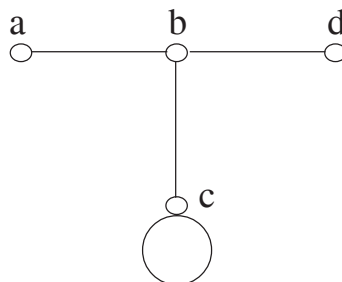
Instructions :

- 1) *Figures to the right indicate full marks.*
- 2) *Use of single memory, non-programmable scientific calculator is allowed.*

Q1) Attempt each of the following:

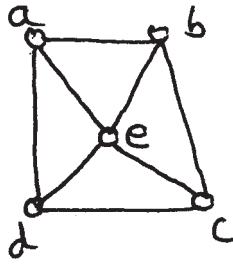
[10]

- a) How many three letter words can be formed from letters in the set $\{a, b, y, z\}$ if repeated letters are allowed?
- b) In how many ways can a prize winner choose three CDs from the top ten list if repeats are allowed?
- c) Show that if any four numbers from 1 to 6 are chosen, then two of them will add to 7.
- d) Which of the following is linear homogeneous recurrence relation? Why?
 - i) $a_n = (-2) a_{n-1}$
 - ii) $a_n = a_{n-1} + 3.$
- e) Give an example of a graph on five vertices with exactly two components.
- f) Tell whether the following graph has an Euler circuit. Explain.

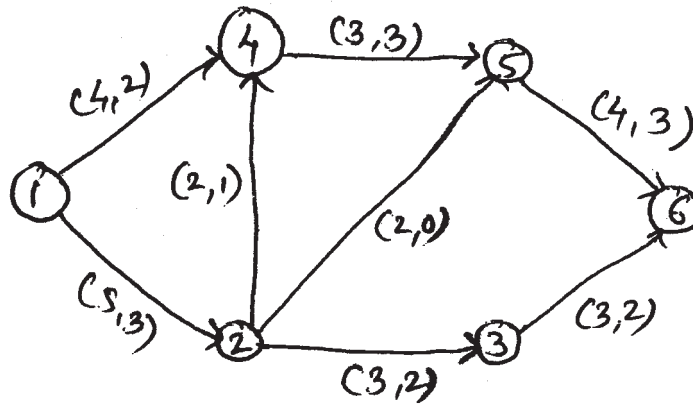


P.T.O.

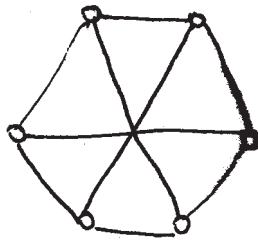
- g) Find a Hamiltonian circuit for the graph given below.



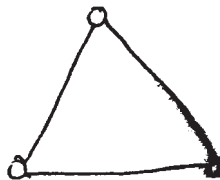
- h) Is a flow conserved at node 4 in the following network? Why.



- i) Is the following graph bipartite? Why?



- j) Find the chromatic polynomial for the following graph.



Q2) Attempt any two of the following:

[10]

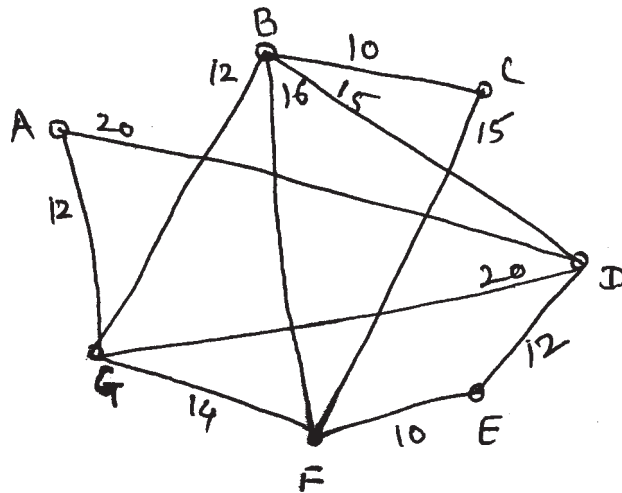
- a) Prove that every positive integer $n > 1$ can be written uniquely as

$$P_1^{\alpha_1} P_2^{\alpha_2} \dots P_s^{\alpha_s}, \text{ where the } P_i \text{ are primes and } P_1 < P_2 < \dots < P_s.$$

- b) Five fair coins are tossed and results are recorded.
- How many different sequences of heads and tails are possible?
 - How many of the sequences in part (i) have exactly one head recorded.
 - How many of the sequences in part (i) have exactly three heads.
- c) Show that if seven points are selected in a hexagon whose sides have length 1 unit, at least two of the points must be no farther apart than 1 unit.

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

- Solve the recurrence relation $d_n = 2d_{n-1} - d_{n-2}$ with initial conditions $d_1 = 1.5$, and $d_2 = 3$.
- Prove that if a graph G has no loops or multiple edges, then twice the number of edges is equal to the sum of the degrees of all vertices.
- Use Kruskal's algorithm to find a minimal spanning tree for the following graph.



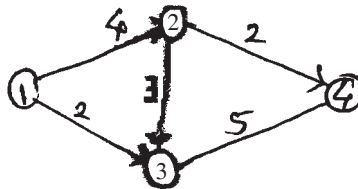
Q4) Attempt any one of the following. [10]

- If a graph G has more than two vertices of odd degree, then prove that there can be no Euler path in G .

- ii) Let M_R be the matrix of a marriage suitability relation between five men and five women. Can each man marry a suitable woman?

$$M_R = \begin{bmatrix} 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{bmatrix}$$

- b) i) Let G be a bipartite graph. What is $\chi(G)$? Explain your answer.
 ii) Find a maximum flow in the following network by using the labelling algorithm.



□□□□

Total No. of Questions : 4]

[Total No. of Pages : 3

P506

[3717]-230

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

OPTIONAL ENGLISH (New Course)

Enriching Oral and Written Communication in English

Time : 2 Hours]

[Max. Marks : 40

Instructions :

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

Q1) Attempt any two of the following.

[10]

- a) You applied for the post of a Lecturer in Chemistry and have been asked to appear for an interview. Write down five questions that you could be asked and their possible answers regarding qualification, experience, salary, contributions, plans in the concerned field etc.
- b) Imagine that you are the Chairman of a meeting. List some of the special features of conducting a formal meeting.
- c) Ashok, Amir, Ramesh and Jyoti are participants in a group discussion on the topic 'Pollution: Causes, Effects and Remedies'. Write a transcript of the discussion using the following points.

Introduction - definition - types of pollution - man made and nature caused pollution - urbanisation - overpopulation - industrialisation - deforestation - effects - global warming - changes in seasonal cycles - preventive measures - population control - eco friendliness - educating the masses - conclusion.

Q2) Attempt any two of the following.

[10]

- a) Write a paragraph of about 15 sentences on the topic 'Need of Social Service'.
- b) Punctuate the following paragraph.

a summary is a shortened version of a letter a passage a report an article a chapter it is written in the summarisers own words the skill of summarising is useful in all situations it saves time summaries are of great help in checking of a book or an article.

P.T.O.

- c) Summarize the following paragraph to one third of its length. Suggest a suitable title. Prepare rough draft.

Waste can be classified as city waste, industrial waste, organic waste, chemical waste, degradable waste, non-degradable waste etc. One of the important differentiating criteria is 'Degradable' and 'Non-Degradable' waste. Every house produces a lot of waste. There are three places in a house that generate Waste: kitchen, other rooms, courtyard or garden. Housewives generally take utmost care to keep the house clean. Domestic waste is thrown carelessly on to the roadside, garbage box and most of the times in the open space. This attracts stray animals and flies. The decomposing waste produces bad smell, as it is wet. Thus, the roadside becomes ugly and obscene. It causes health problem and the air pollution level also increases.

There are various ways of disposing the waste. One of the effective and useful means is Terrace Gardening. Nowadays due to bungalow, flat culture and concrete jungle everywhere, there is very little space left for gardening in the courtyard. In semi-urban and urban areas also there is tremendous rise in bungalows, row houses and residential complexes. As very little or no space is left for gardening, terrace can be used for gardening successfully. In large residential complexes and societies more space on ground floor can be made available for garden and job to a family.

Q3) Attempt any two of the following.

[10]

- a) Choose the more powerful of the two words or phrases given.
- i) I was hungry so I ————— (gobbled up/ ate up) my food quickly.
 - ii) I wonder where they got these ————— (dress items/costumes) from.
 - iii) I was busy in the afternoon ————— (attending/receiving) calls.
 - iv) He ————— (looked at/squinted at) the kite flying high above his head.
 - v) The stream ————— (gushed out/came out) of a crack in the mountainside.

- b) Write a review of a movie that you watched recently. Take into account the following points: plot, character, setting, theme, message, social/moral implication, your opinion.
- c) Write a description of a doctor you know taking into consideration his/her personality, character, mood and thoughts.

Q4) Attempt any two of the following.

[10]

- a) Imagine that you are the Sports Secretary of your college. Write an e-mail to sports goods dealer having address championsports@hotmail.com asking for trade catalogue. Mention the items you intend to buy and ask for a discount on the catalogue price and early delivery.
- b) Prepare 5 slides of about 20 words each for power point presentation that you would like to make in a function on the topic: 'Career Opportunities for the Students of Science'. You can make use of the following points :: Introduction – market value – traditional degree – jobs available – business – research.
- c) You want to seek admission in Government College of Science. You make a call to clerk asking him about the procedure, fees last date etc. Write a short telephone conversation on this situation.



ǎǎ 2) A* {ZÉ[c{IV}_]!go! Há.Xo !ǎǎm |Hé:Úa! {c{E, ' [8]

- i* gVZm!Hé:XZ!XZ!OZ!Hm!n[aM!Xr{CE, '
- ii* gom!~wAnArZon[V!go!ZnaOOn|!dVr!h! ,?
- iii* #M\!Hé:Xd/(!HmZr!Hé: mAHmM[a! {MU!Hé{CE, '
- iv> ##AÚon|!Zoh_|!ǎǎgX!Hé:|!m{Hé:VZ!Vch!é!_|!Xm!h! , '(((Egm!achmZOn|
Hé:Vh!h! ,!?

Am* {ZÉ[c{IV!AdAU!Hé:gg¹X¹/₂i ñm!Hé:{CE, ' [5]

- i* ##S!~hĀ!am!Hé:Xh!go!Oa!IMN!hZ!a!~Q!a!Hé:cm!hW!W!~!hĀo{~Z!Zo
XOr!h!A!Zr!A!Ām!o!go!Ūm!Xr!Ma!hU!cm, '((

Awǎm

- ii* ##>V!o!HĀV! ^r!Zt!H!am!Ā '!Bj!~V!HĀo!ôH!a!H!a!co! {H!_>|qXr!_|
V!c!ahĀ!~H!en{Q!~é!c!a, 'HĀV!Zt!H!a!g!m"!Og!_ar!qXr!_|!A!~V!ôQm
cJm!h! , '((

ǎǎ 3) A* {ZÉ[c{IV}_]!go! Há.Xo !ǎǎm |Hé:Úa! {c{E, ' [8]

- i* #naV!dXm(!Hé{dm!_|!Hé{d!naV!Hé:ô!d!Hm!JWJZ! {Hg!ā!H!a!H!am!h!!?
- ii* Hé{d! {Zam!Zo!qXr!Hé:gvZn|!Hé:~ao!_|!Hm!Zgo! {Ma!X! {H!h!>!?
- iii* #ā!_!qō_(!Hé{dm!_|!Hé{d!n!V!Zo!an{~!Hm!d!Z! {Hg!ā!H!a! {H!m!h!!?
- iv> #ĀV!Bao(!Hé{dm!Hé:ā!V!HĀô!Hm!ô!>!Hé{CE, '

Am* {ZÉ[c{IV!AdAU!Hé:gg¹X¹/₂i ñm!Hé:{CE, ' [5]

- i* ##c¹Hm!n!Xc.e!Xc
!!J{Q!V!no{¹/₂gn!a!Ob
!!Ym!n!ew!M!MU.~w!c
!!!ô!d!H!a!~hĀ!A!¹/₂^ao, '((

Awǎm

- ii* ##!!!!!!!!!!!!!!!!!!!!!!!!!!ad!y!¹/₂
!!!!!!!!!!!!!!gv!X!W!O!m!gZ!"
ô!Z!_m!Z!~!ā!w!nX!ZV! {M!dZ
h!m!m!~!ra!h!g!ô!X!W!H!é:jJ
g¹`_!V!h!Hm!Y!a!r!gn!_Z, '((

□□□□

Total No. of Questions : 4]

[Total No. of Pages : 2

P511

[3717]-236

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

INDUSTRIAL CHEMISTRY

VOC-221 : Unit Processes in Organic Industries

(Sem. - II)(Paper - I)

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 equation with conditions for the following. **[16]**

- a) Naphthalene $\rightarrow$ Phthalic anhydride.
- b) Synthesis of benzene sulphonic acid from benzene.
- c) Acetaldehyde $\rightarrow$ acetic acid.
- d) Benzene $\rightarrow$ Nitrobenzene.
- e) Chloroacetic acid $\rightarrow$ Glycine
- f) Benzene $\rightarrow$ Dodecyl benzene
- g) M-dinitrobenzene $\rightarrow$ M-nitroaniline
- h) Ethanol $\rightarrow$ ethyl chloride

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

- a) Describe commercial production of vinyl acetate.
- b) Write a orientation effect of nitration of chlorobenzene.
- c) Describe synthesis of methanol.

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

- a) How are halogenation reactions classified?
- b) What is esterification? Write the important uses of esters.
- c) Describe Friedel Craft's reaction.

P.T.O.

Q4) Describe liquid phase oxidation of acetaldehyde to prepare acetic acid. [8]

OR

Write the mechanism of sulphonation and describe the continuous sulphonation of benzene.

□□□□

Total No. of Questions : 4]

[Total No. of Pages : 2

P512

[3717]-237

S.Y. B.Sc. (Vocational)

BIOTECHNOLOGY

Voc-Biotech. : 221 - Plant and Animal Tissue Culture

(Sem. - II) (Paper - I) (2008 Pattern)

Time : 2 Hours]

[Max. Marks : 40

Instructions :

- 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 cell lineage.
- b) Give role of CO₂ incubator in animal tissue culture.
- c) Phenol red is added in animal cell culture medium. Why?
- d) What is mechanical disaggregation?
- e) Give any two applications of continuous cell lines.
- f) Define the term 'Callus'.
- g) Name the osmoticum used in plant tissue culture.
- h) What is hardening of plantlets?
- i) Give role of IAA in plant tissue culture.
- j) What is incubation?

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

[10]

- a) Autoclave.
- b) Serum free media.
- c) Cell repository.

P.T.O.

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

- a) Give characteristics of transformed cells.
- b) What is subculturing? Explain its necessity in plant tissue culture.
- c) Describe the method of surface sterilization of explant.

Q4) What is organ culture? Discuss different methods of organ culture. **[10]**

OR

Describe in detail initiation and establishment of protoplast culture.

□□□□

Total No. of Questions : 4]

[Total No. of Pages : 2

P513

[3717]-239

S.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

VOC-EEM : 221 - Audio, Video and Office Equipments - B

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

Time : 2 Hours]

[Max. Marks : 40

Instructions :

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

Q1) a) Attempt all:

- i) What is multimedia computer? [1]
- ii) What is cache memory? Where it is used? [1]
- iii) What is motherboard? [1]
- iv) What is burn-in? How to avoid it? [1]

b) Attempt all:

- i) State the types of mouse. Explain its working. [2]
- ii) State various i/p devices to PC. [2]
- iii) Classify storage devices. Give one example each. [2]
- iv) Explain pen drive. [2]

Q2) Attempt any two of the following:

- a) What do you mean by impact and non-impact printer. Dot matrix printer belongs to which type? Discuss its advantages and disadvantages. [4]
- b) How does a touch screen work? [4]
- c) What is bar code? Write a note on bar code scanner. [4]

P.T.O.

Q3) Attempt any two of the following.

- a) List different data projectors. Write a note on any one of them. [4]
- b) Write a note on LCD. [4]
- c) Write a note on rolling and large screen displays. [4]

Q4) Answer the following.

- a) Explain the operation of laser printer. [6]
- b) Explain the working of CCD camera. [6]

OR

- a) State and explain various components of motherboard. [6]
- b) Describe the construction of opto-mechanical mouse. Also explain its working. [6]

□□□□

Total No. of Questions : 4]

[Total No. of Pages : 2

P514

[3717]-241

S.Y. B.Sc. (Vocational)
SEED TECHNOLOGY
Vegetable Seed Production
(Sem. - II) (Paper - III) (New Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions :

- 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 microsporogenesis.
- b) What is pollen viability?
- c) Give any two objectives of hybridization.
- d) Define introduction.
- e) Give any two objectives of mass selection.
- f) What is cytoplasmic male sterility?
- g) What is roughing?
- h) Define isolation.
- i) What do you mean by vegetative type of reproduction.
- j) Define self incompatibility.

Q2) Attempt any two of the following.

[2×5=10]

- a) Describe the objectives of vegetable seed production.
- b) Define megasporogenesis. Sketch & label the L.S. of ovule.
- c) Comment on self incompatibility.

P.T.O.

Q3) Write note on (Any two).

[2×5=10]

- a) Procedure of hybridization.
- b) Bulk method.
- c) Applications and achievements of population improvement.

Q4) Describe the stepwise procedure for seed production with reference to land requirement, isolation, nursery management, cultural practices, roughing, harvesting and seed extraction in Brinjal. **[10]**

OR

Describe the procedure for seed production with reference to land requirement, isolation, nursery management, cultural practices, roughing, harvesting in Onion.

□□□□

Total No. of Questions : 4]

[Total No. of Pages : 2

P515

[3717]-242

S.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

**VOC-IND-MIC-221 : Microbial Fermentations and
Downstream Processing**

(Sem. - II) (2008 Pattern) (Theory Paper - I)

Time : 2 Hours]

[Max. Marks : 40

Instructions :

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) All questions carry equal marks.*
- 4) Draw neat labelled 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) Give another name for Vitamin B₁₂.
- b) Name the product(s) produced by the action of beta-amylase on starch.
- c) Fill in the blank:
_____ enzyme can be used to lyse fungal cells.
- d) Fill in the blank:
Ultrasonication cannot be used for lysing microbial cells in large scale operations because _____ .
- e) State whether the statement is True or False.
Glutamic acid is a primary metabolite.
- f) State whether the statement is True or False.
At acidic pH, Penicillin gets converted to penicilloic acid.
- g) Define : 'Partition Coefficient'.
- h) Name the organism used as bioinoculant for solubilizing phosphate.

P.T.O.

- i) State the role of Kieselguhr in downstream processing of fermentation products.
- j) Name any two processes involved in the formulation of finished fermentation products.

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

- a) With the help of a diagram, explain the principle of filtration as a method of solids separation.
- b) Enlist the salts used for the precipitation of proteins from fermented broth. Describe the method of enzyme precipitation using salts.
- c) Explain principle of affinity chromatography with the help of suitable example.

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

- a) Draw the flow-chart for explaining steps involved in cheese production.
- b) What are bioinoculants? What are the advantages of using bioinoculants over their chemical counterparts?
- c) Explain the biochemistry involved in acetic acid production.

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

- a) With the help of a flow-sheet, describe the production of Penicillin G by fermentation.
- b) Describe the principle and working of centrifugation process used in down-stream processing.



Total No. of Questions : 4]

[Total No. of Pages : 2

P516

[3717]-243

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

Time : 2 Hours]

[Max. Marks : 40

Instructions to 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) Define London Smog.
- b) Name two pollutants in dairy wastes.
- c) Define night soil.
- d) Explain stone Leprosy in brief.
- e) Explain the term 'inversion of stratosphericTemperature'.
- f) Differentiate between temporary and permanent hardness of water.
- g) Define BOD.
- h) Distinguish between sullage and refuge.

Q2) Attempt any two of the following.

[8]

- a) Explain reverse osmosis and give its applications.
- b) How is radioactivity removed from water?.
- c) Explain the hazards of nitrogen oxides on humans.

P.T.O.

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

- a) Pesticide pollution.
- b) Tannery wastes.
- c) Ill-effects of particulate organic matter.

Q4) Explain the construction and working of the Imhoff tank. [8]

OR

Describe any one biospherical cycle in detail.



Total No. of Questions : 4]

[Total No. of Pages : 2

P517

[3717]-244

S.Y. B.Sc. (Vocational)

BIOTECHNOLOGY

VOC-Biotech-222 : Immunology

(Sem. - II) (2008 Pattern) (Paper - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions :

- 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 : Cytokines.
- b) Enlist any two immunodiffusion techniques.
- c) Give the role of macrophages in immunity.
- d) Describe the significance of IgA.
- e) What are secondary lymphoid organs?
- f) Give any one example of passive immunisation.
- g) Explain haptens with example.
- h) How are attenuated vaccines prepared?
- i) Give any two mechanisms by which skin acts as a barrier against infection.
- j) What are the types of T cells involved in the specific immune response?

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

[10]

- a) Immunoglobulins structure.
- b) Humoral immune response.
- c) Phagocytosis.

P.T.O.

Q3) Attempt any two of the following. (8-10 lines)

[10]

- a) Describe different types of antigens.
- b) Add a comment on hypersensitivity reaction.
- c) What is clonal selection theory? Give its significance in antibody production.

Q4) Describe the classical and alternative pathway of complement cascade in detail.

[10]

OR

Describe the direct, indirect and sandwich method of ELISA.

□□□□

Total No. of Questions : 4]

[Total No. of Pages : 2

P518

[3717]-246

S.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

VOC-EEM-222 : Maintenance and Repair of Audio,

Video, Office and Communication Equipment

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

Time : 2 Hours]

[Max. Marks : 40

Instructions :

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

Q1) Answer all of the following:

- a) What is the bandwidth of FM broadcast channel? [1]
- b) What causes temporary loss of satellite signal? [1]
- c) What causes 'moire' effect in a TV picture? [1]
- d) How many photodiodes are present in the detector block of a CD player? [1]
- e) Explain the fault of 'Noisy picture on playback' in case of a VCR. [2]
- f) What is the need for formatting a mobile phone? What is the effect of formatting? [2]
- g) If AGC is faulty, what is the symptom in radio reception? [2]
- h) What could be the fault if there is no output signal from any of the channel in a stereo system? [2]

Q2) Answer any two of the following.

- a) Explain different causes of irregular tape movement in a tape recorder.[4]
- b) Explain the faults in diode detector and AGC circuit in an AM Receiver. [4]
- c) Explain any two faults and their causes in a mobile phone instrument.[4]

P.T.O.

Q3) Answer any two of the following.

- a) How can the faulty section in a TV be located if there is:
 - Snowy picture with distorted sound.
 - No raster, sound normal. [4]
- b) Explain the setup for aligning IF stages of a TV Receiver. [4]
- c) What is the difference between a VCD and a DVD? How do the players differ? [4]

Q4) Answer the following.

- a) What is degaussing in CRT picture tubes? How is it done? [6]
- b) Explain the working of optical head in a CD player. [6]

OR

- a) Write a note on trouble shooting in inkjet printers. [6]
- b) What is 'stereo' effect? What are the parts in a typical music system? Explain any two typical faults occurring in such a system. [6]

□□□□

Total No. of Questions : 4]

[Total No. of Pages : 2

P519

[3717]-248

**S.Y. B.Sc. (Vocational)
SEED TECHNOLOGY
Seed Quality Control**

(Paper - IV) (Sem. - II) (New Course)

Time : 2 Hours]

[Max. Marks : 40

Instructions :

- 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 breeder's seed.
- b) What is GOT?
- c) Give any two objectives of field inspection.
- d) Define seed sampling.
- e) Give the outline of organization of Seed Certification Agency.
- f) Define isolation distance.
- g) What is germination?
- h) Give the specifications of tag of foundation seed.
- i) Define certification of seed.
- j) What is Seed Legislation?

Q2) Attempt any two of the following:

[2×5=10]

- a) Describe the procedure for Seed Certification.
- b) Explain general principles of field inspection.
- c) Give the powers of seed inspector.

P.T.O.

Q3) Write notes on any two of the following:

[2×5=10]

- a) Central Seed Committee.
- b) State Seed Certification Agency.
- c) Seed Legislation in India (Seed Act, 1996).

Q4) Give in detail the procedure of seed law enforcement.

[10]

OR

Describe in detail general seed certification standards.

□□□□

Total No. of Questions : 4]

[Total No. of Pages : 2

P520

[3717]-249

S.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

VOC-IND-MIC-222 : Quality Assurance in Industrial Products

(Theory Paper - II) (Sem. - II) (2008 Pattern)

Time : 2 Hours]

[Max. Marks : 40

Instructions :

- 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) Define "Quality Control".
- b) Define "Sterile".
- c) Give the full form of "AGMARK".
- d) Give the full form of 'ISO'.
- e) State whether the following statement is TRUE / FALSE.
All injectables should only be sterile.
- f) State whether the following statement is TRUE / FALSE.
Gel diffusion microbiological assays are more sensitive than turbidimetric microbiological assays for testing antibiotics.
- g) State whether the following statement is TRUE / FALSE.
The LAL test was first designed for Gram positive bacterial pathogens.
- h) State whether the following statement is TRUE / FALSE.
Allergen testing is an important test for packaged drinking water.
- i) State whether the following statement is TRUE / FALSE.
All heat sterilized products are pyrogen-free.
- j) Name any one medium used for testing for sterility of a product.

P.T.O.

Q2) Answer any two of the following. [10]

- a) Explain the advantages of the 'Modified Ames Test'.
- b) What is the difference between the tests used for pyrogen testing using animals and LAL test?
- c) Describe the test for 'undue toxicity'.

Q3) Answer any two of the following. [10]

- a) Briefly explain the role of pharmacopeias in quality assurance.
- b) State the name and the role of the dye used in the medium used for checking the presence of anaerobic bacteria in a sterilized product.
- c) Explain the role of the FDA in controlling the quality of products.

Q4) Answer any one of the following. [10]

- a) With the help of a suitable example, explain the standardization required before any microbiological assay can be performed.
- b) Enlist the quality assurance tests carried out for 'packaged drinking water'. Explain why only these tests are required.

□□□□