

Total No. of Questions : 4]

SEAT No. :

**P386**

**[5215]-101**

**[Total No. of Pages : 2**

**S.Y.B.Sc.**

**MATHEMATICS**

**MT - 211 : Multivariable Calculus - I  
(2013 Pattern) (Paper - I) (Semester - 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)** Attempt any five of the following:

**[10]**

- a) Sketch the domain of  $f(x, y, z) = \frac{1}{x^2 + y^2 + z^2}$ . What is the range of the function  $f(x, y, z)$ ?
- b) Show that (0,0) is critical point of the function  $f(x, y) = (x + y - 1)(x^2 + y^2)$ .
- c) State Taylor's formula for function of two variables.
- d) If  $f(x, y) = \log(x^3 + y^3 - x^2y - xy^2)$  then show that  $\frac{\partial f}{\partial x} + \frac{\partial f}{\partial y} = \frac{2}{x + y}$ .
- e) Find the direction in which the function  $f(x, y) = x^2y + e^{xy}$  siny increase most rapidly at (1,0).
- f) State strong form of Fubini's theorem.
- g) Find Jacobian  $\frac{\partial(x, y)}{\partial(u, v)}$ ; where  $u = x + 2y$  &  $v = x - y$ .

**Q2)** Attempt any two of the following:

**[10]**

- a) Define  $f(0,0)$ , so that the function  $f(x, y) = \frac{3x^2y}{x^2 + y^2}$  be continuous at the origin.

**P.T.O.**

- b) If  $f(x,y)$  is a function of two variables  $x$  and  $y$  defined on a neighbourhood of  $(x_0, y_0)$  and which is differentiable at  $(x_0, y_0)$  then prove that,
- $f(x,y)$  is continuous at  $(x_0, y_0)$
  - $f_x(x_0, y_0)$  and  $f_y(x_0, y_0)$  both exists.
- c) If  $u = f(x,y)$  is a differentiable function of  $x$  &  $y$ ,  $x = \phi(t)$ ,  $y = \psi(t)$  are differentiable functions of single variable 't' then prove that the composite function  $u = f[\phi(t), \psi(t)]$  is differentiable function of single variable 't' and  $\frac{du}{dt} = \frac{\partial u}{\partial x} \cdot \frac{dx}{dt} + \frac{\partial u}{\partial y} \cdot \frac{dy}{dt}$ .

**Q3)** Attempt any two of the following:

**[10]**

- Explain Lagrange's method of undetermined multiplier.
- Find the directional derivative of  $f(x, y, z) = x^2 + 2y^2 - 3z^2$  at  $(1, 1, 1)$  along the line joining the points  $(0, 0, 0)$  and  $(1, 1, 1)$ .
- If  $z = f(x + ay) + \phi(x - ay)$  then prove that  $\frac{\partial^2 z}{\partial y^2} = a^2 \frac{\partial^2 z}{\partial x^2}$ .

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

**[10]**

- If  $\int_0^1 \int_0^{4-a-x^2} \int_a^{4-x^2-y} dz dy dx = \frac{4}{15}$  then find the value of  $a$ .
  - Find the area of the region  $R$  enclosed by the parabola  $y = x^2$  and the line  $y = x + 2$  by using double integration.
- Change the Cartesian integral into an equivalent polar integral and then evaluate the integral.  

$$\int_0^1 \int_0^{\sqrt{1-x^2}} e^{-(x^2+y^2)} dy dx.$$
  - Find the quadratic approximation for  $f(x,y) = x^y$  near the point  $(1, 1)$ .

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SEAT No. :

**P387**

**[5215]-102**

[Total No. of Pages : 4

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

**MATHEMATICS**

**MT - 212 (A) : Discrete Mathematics  
(2013 Pattern) (Semester - I) (Paper - II (A))**

*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 is not allowed.*

**Q1)** Attempt any FIVE of the following: **[10]**

- a) Rewrite 'If productivity increases then wages rise' without using the conditional.
- b) Determine the truth value of 'Paris is in England if and only if  $2 + 3 = 8$ '.
- c) Write Inclusion - Exclusion principle for three sets.
- d) How many different license plates can be printed containing two letters followed by three digits with the first digit not zero?
- e) A bag contains five red and six white marbles. Find the number of ways that four marbles can be drawn from the bag are of the same colour.
- f) Write the negation of 'All students live in the hostel'.
- g) Determine the truth value of  $\exists x, \forall y, x^2 < y + 1$ ; if universe of domain is  $A = \{1, 2, 3\}$ .

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

- a) Test the validity of the following argument by using the laws of logic- Team A will win the cricket match if they are playing against team B. If team A does not win then team C will take away the trophy. Team C does not get the trophy. Hence team A does not play against team B.
- b) If a collection of objects consists of  $r_1$  identical objects of type 1,  $r_2$  identical objects of type 2, -----,  $r_k$  identical objects of type K; where  $r_1 + r_2 + \dots + r_k = n$  then prove that the total number of different

$$\text{arrangements of these } n \text{ objects is } \frac{n!}{r_1! \times r_2! \times \dots \times r_k!}.$$

- c) Out of 10 families, six families have dogs, four have cats and two have neither cats nor dogs. Find the number of families that have both cats and dogs.

**P.T.O.**

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

- a) Use method of contrapositive to show that if  $n^3 + 5$  is odd then  $n$  is even; where  $n$  is an integer.
- b) Out of a collection of 5 types  $\{A, B, C, D, E\}$  of items, in how many ways can we purchase 4 items?
  - i) Containing at least two As
  - ii) Containing exactly two As.
- c) Prove that  $P \rightarrow (q \wedge r) \equiv (p \rightarrow q) \wedge (p \rightarrow r)$ .

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

- a) Find the number of elements in  $A \cup B \cup C$  if there are 100 elements in each set and if
  - i) The sets are pairwise disjoint.
  - ii) There are 50 common elements in each pair of sets and no element common in all three sets.
  - iii) There are 50 common elements in each pair of sets and 25 elements common in all three sets.
  - iv) The sets are equal.
- b)
  - i) Define tautology. Determine whether  $(p \wedge q) \wedge \sim (p \vee q)$  is tautology or not.
  - ii) Write 'All good students study hard' in symbolic form using quantifiers. What are the truth values of  $Q(3, 0)$  and  $Q(2, 7)$  if  $Q(x, y)$  is  $x^2 = y - 3$ .



Total No. of Questions : 4]

**P387**

**[5215]-102**

**S.Y.B.Sc.**

**MATHEMATICS**

**MT - 212 (B) : Laplace Transform and Fourier Series  
(2013 Pattern) (Semester - I) (Paper - II (B))**

*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 any five of the following:

**[10]**

- a) Find the Laplace transform of  $f(t) = t^2 - 3t + 5$ .
- b) If  $L\{f(t)\} = s^2 e^s$  then find  $L\{f(4t)\}$ .
- c) Solve the differential equation  $(D - 1)y = 0$  given  $y(0) = 2$ .
- d) Find  $L^{-1}\left\{\frac{1}{s^2 - 6s + 13}\right\}$ .
- e) Find the laplace transform of  $t^{-1/2}$  using Gamma function.
- f) Define the fourier seris.
- g) Find inverse Laplace transform of the function  $\phi(s) = \frac{s}{(s+7)^4}$ .

**Q2)** Attempt any two of the following:

**[10]**

- a) Using definition of Laplace transform prove that,  $L\{e^{at}\} = \frac{1}{s-a}$ . hence find  $L\{\cosh at\}$ .
- b) If  $L\{f''(t)\} = \tan^{-1}\left(\frac{1}{s}\right)$ , given  $f(0) = 3$ ,  $f'(0) = -2$  then find  $L\{f(t)\}$ .
- c) If  $L\{f(t)\} = \phi(s)$  and  $a$  be any positive real constant then show that  $L\{f(at)\} = \frac{1}{a}\phi\left(\frac{s}{a}\right)$ .

**Q3)** Attempt any two of the following:

**[10]**

a) Solve the differential equation  $y'' + y = t$ , given that  $y(0) = 1$  and  $y'(0) = -2$ .

b) Find  $L^{-1} \left\{ \frac{s}{s^2 + 4s + 3} \right\}$ .

c) If  $L^{-1} \{ \phi(s) \} = f(t)$ , then prove that  $L^{-1} \{ e^{-as} \phi(s) \} = \begin{cases} f(t-a), & t \geq a \\ 0, & t < a \end{cases}$ .

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

**[10]**

a) State and prove convolution theorem.

Hence find Inverse Laplace transform of.

$$\frac{1}{s(s^2 + 1)}.$$

b) Find fourier series expansion of  $f(x) = e^x$  in the interval  $[-\pi, \pi]$ .



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SEAT No. :

**P388**

**[5215]-103**

[Total No. of Pages : 3

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

**PH - 211 : PHYSICS**

**Mathematical Methods in Physics - I  
(2013 Patter) (Semester - I) (Paper - I)**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

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

**Q1)** Attempt all of the following:

**[10]**

- a) Decide degree and order of

$$x \frac{d^2 y}{dt^2} + 4 \left( \frac{dy}{dt} \right)^2 + xy = 0$$

- b) Represent complex number  $(4 - 6i)$  on Argand diagram.

- c) Show that  $dF = (5x^2 + 3y)dx + (3x - 5y^2)dy$  is exact differential.

- d) Determine the value of  $i + i^2 + i^3 + i^4$ .

- e) What is implicit function?

- f) Using hyperbolic function show that  $\cosh \theta = \cos(i\theta)$ .

- g) If  $F(x, y) = 2x^3 y^2 + y^3$ , Find  $F_x$  and  $F_y$ .

- h) If  $x + iy = \frac{1 + 2i}{1 - 4i}$ . Determine  $x$  and  $y$ .

**P.T.O.**

- i) Find the value of 'p' if the two vectors  $\vec{A} = pi + 2j + 3k$  and  $\vec{B} = i + 5j + pk$  are perpendicular.
- j) State any three frequently occurring differential equations, in physics.

**Q2)** Attempt any two of the following:

**[10]**

- a)  $\vec{\nabla} \cdot (\phi \vec{A}) = \vec{\nabla} \phi \cdot \vec{A} + \phi (\vec{\nabla} \cdot \vec{A})$ .
- b) The resistance R of a uniform wire of length 'l' and 'R' resistance is given by  $R = \frac{\sigma l}{\pi r^2}$  where ' $\sigma$ ' is the specific resistance. If error in the measurement of length and radius are 2% and 3% respectively. Find the maximum possible percentage error in resistance.
- c) Interpret the following equation geometrically  $|z + 3| = 2|z - 3|$  where  $z = x + iy$ .

**Q3)** Attempt any two of the following:

**[10]**

- a) Using total differentiation find approximate value of  $[(6.01)^2 + (8.01)^2]^{1/2}$ .
- b) If  $\vec{A} = xz^3 \hat{i} - 2x^2yz \hat{j} + 2yz^4 \hat{k}$ . Find  $\vec{\nabla} \times \vec{A}$  at point (1, 2, 1).
- c) Show that the point  $x = 0$  is an irregular singular point of the differential equation  $x^2(x-2)^2 \frac{d^2y}{dx^2} + 2(x-2) \frac{dy}{dx} + (x+3)y = 0$

**Q4) A)** Attempt a or b of the following:

**[8]**

- a) i) Determine the fourth root of  $i$ .
- ii) Prove that  $\vec{v} = 3y^4 z^2 \hat{i} + 4x^3 z^2 \hat{j} - 3x^2 y^2 \hat{k}$  is a solenoidal vector.

OR

b) i) Find the slope of tangent to the curve  $x^3 + 3xy^2 - y^3 = 0$  at  $x = 2$  and  $y = -3$ .

ii) Find the area of a parallelogram whose adjacent sides are  $(\hat{i} - 2\hat{j} + 3\hat{k})$  and  $(2\hat{i} + \hat{j} - 4\hat{k})$ .

B) Attempt any one of the following: [2]

a) If  $\vec{A} = 3\hat{i} - \hat{j} - 2\hat{k}$  and  $\vec{B} = 2\hat{i} - 3\hat{j} - \hat{k}$  Find  $(\vec{A} - \vec{B}) \times (\vec{A} + \vec{B})$   
 $= 2\vec{A} \times \vec{B}$ .

b) If  $\phi = 3x^2y - y^3z^2$  find grad  $\phi$  at point  $(1, -2, -1)$



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 5

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[5215]-104

S.Y.B.Sc. (Regular)

PHYSICS

PH-212 (A) : Electronics -I

(2013 New Pattern) (Semester - I) (Paper - II (A))

Time : 2 Hours]

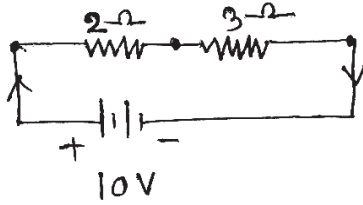
[Max. Marks : 40

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Use of calculators and log tables are allowed.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Symbols have their usual meanings.

Q1) Attempt all of the following.

- a) State Norton's theorem. [1]
- b) What is power in the following circuit. [1]



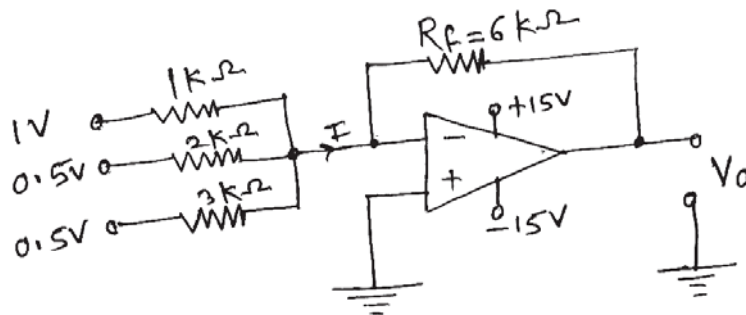
- c) Define quiescent point (Q-point). [1]
- d) For transistor  $\beta=9$ . Find the value of  $\alpha$ . [1]
- e) What is UJT? Draw its symbol. [1]
- f) Draw pin diagram of IC 741. [1]
- g) What is negative feedback? [1]
- h) Define ripple factor. [1]
- i) Draw symbol of EX - NOR gate. Write its truth table. [1]
- j) Convert the decimal number  $(18)_{10}$  into equivalent binary number. [1]

P.T.O.

**Q2)** Attempt any two of the following.

a) Explain the construction and working of UJT as relaxation oscillator. Derive its frequency formula. [5]

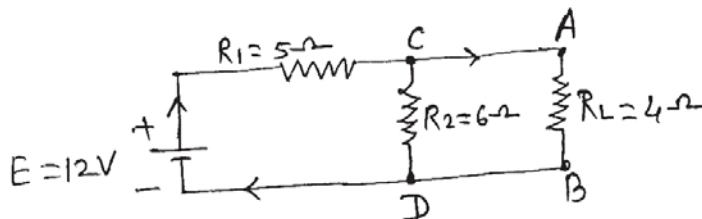
b) Find the output of the following circuit. [5]



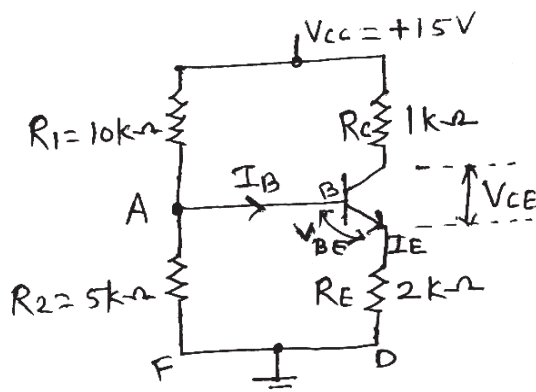
c) Explain zener diode as a voltage regulator. [5]

**Q3)** Attempt any two of the following.

a) Using Thevenin's theorem, determine the current flowing through  $R_L$  of the network shown in the figure. [5]



b) In the voltage divider bias method, determine emitter current and obtain the values of Q point. Take  $V_{BE} = 0.7$  volt for silicon. [5]



c) Reduce the following Boolean expression and draw the logic diagram as well. [5]

$$\bar{A}BCD + BCD + B\bar{C}D + B\bar{C}\bar{D}$$

**Q4)** A) Attempt (a) or (b) of the following.

- a) i) Describe working of a transistor as an amplifier. [4]
- ii) Define oscillator and give its type. What is Barkhausen criterion of oscillation? [4]
- b) i) Explain with circuit diagram, op-amp as a subtractor. [4]
- ii) Find two's complement of numbers, [4]
  - 1) 01001110
  - 2) 00110101

B) Attempt any one of the following.

- a) With neat circuit diagram, state maximum power transfer theorem. [2]
- b) In centre tapped full-wave rectifier, the rms half secondary voltage is 9V. Assuming ideal diodes and load resistance  $R_L = 1k\Omega$ , find peak current. [2]



Total No. of Questions : 4]

**P389**

**[5215]-104**

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

**PHYSICS**

**PH-212 (B) : Instrumentation**

**(2013 Pattern) (Semester - I) (Paper - II (B))**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

- 1) All the questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Draw neat diagrams wherever necessary.*
- 4) Use of calculators and log tables is allowed.*

**Q1)** Attempt all of the following:

**[1 each]**

- a) Define atmospheric pressure.
- b) Calculate the gain of an inverting amplifier. The value of input resistance is  $10K\Omega$  and that of feedback resistor is  $100K\Omega$ .
- c) State the principle used in resistive transducer.
- d) Define Reproducibility.
- e) Draw pin diagram of IC-741.
- f) Define accuracy of measuring system.
- g) State any one application of bimetallic thermometer.
- h) What is a piezoelectric transducer?
- i) State any two types of bourdon tubes.
- j) State any one type of analog recorder.

**Q2)** Attempt any two of the following:

**[5 each]**

- a) Explain load cell with suitable diagram.
- b) Explain with circuit diagram OPAMP as a subtractor.
- c) Explain U-tube manometer as a second order system. Derive the second-order relation between input and output parameters.

**Q3)** Attempt any two of the following:

**[5 each]**

- a) Amount of radiant energy received by the detector pyrometer per unit time is 20J from a hot body. If the emissivity is  $5.6 \times 10^{-3}$  then find the temperature of hot body. (Given: Stefan's constant  $\sigma = 5.72 \times 10^{-8} \text{ W/m}^2\text{K}^4$ )
- b) The resistance of platinum wire is  $6\Omega$  at  $0^\circ\text{C}$  and  $7.2\Omega$  at  $100^\circ\text{C}$ . Calculate the temperature coefficient of resistance  $\alpha$ .
- c) Calculate the gain of non-inverting amplifier when input resistance at inverting terminal is  $10\text{K}\Omega$  and feedback resistance is  $200\text{K}\Omega$ . If the feedback resistance is doubled, what is the change in the voltage gain?

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

- a)
  - i) Describe strip chart recorder. **[4]**
  - ii) Describe with circuit diagram an op-amp as an integrator. **[4]**
- b)
  - i) What do you mean by variable inductance type transducer? Explain how displacement is measured with change in number of turns in inductive transducer. **[4]**
  - ii) Write a note on C-type Bourden tube. **[4]**

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

- a) 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]**
- b) Draw the circuit diagram of Instrumentation amplifier using three OPAMP and state the expression for output voltage. **[2]**



Total No. of Questions : 6]

SEAT No. :

[Total No. of Pages : 3

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[5215]-105

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

**CHEMISTRY**

**CH - 211: Physical and Analytical Chemistry**

**(2013 Pattern) (Semester-I) (Paper-I)**

*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 calculator is allowed.*
- 5) *Answer to the both sections should be written in separate answer books.*

**SECTION-I**

**Q1)** Answer the following:

**[5]**

- a) What is meant by infinite reading?
- b) Write the rate law equation for the reaction  
$$A+B \rightarrow \text{Product}$$
- c) Define 'Photosynthesis'.
- d) What is meant by phosphorescence?
- e) Define 'Partition coefficient'.

**Q2) A)** Attempt any two of the following:

**[6]**

- a) What are the characteristics of first order reactions?
- b) Explain the principle and working of thermopile with suitable diagram.
- c) Explain factors affecting rate of reaction.

**P.T.O.**

- B) Attempt any two of the following: [4]
- a) Explain the term 'chemiluminescence'.
  - b) Explain 'photosensitization'.
  - c) Give one example of pseudounimolecular and second order reaction.

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

- a) The rate of first order reaction is  $4.3 \times 10^{-3}$  per second at  $25^\circ\text{C}$ . Find the time required to complete 75% of the reaction.
- b) In given photochemical reaction  $4 \times 10^{17}$  photons are absorbed per second. After 600 seconds of irradiation  $5.5 \times 10^{-5}$  moles of product was formed. Calculate quantum yield of the reaction.
- c) Calculate the amount of acid extracted from 500 ml of aqueous solution containing 50 gm of an acid on extracting with 250 ml of ether in a single lot. [Given - partition coefficient of an acid in water is 0.55]

## SECTION-II

**Q4)** Answer the following: [5]

- a) Define 'Analytical chemistry'.
- b) Find the proper number of significant figures in
  - i) 0.0810
  - ii) 25.08
- c) Which is the group reagent for IV group in Qualitative analysis?
- d) Why is  $\text{NH}_4\text{Cl}$  added before adding  $\text{NH}_4\text{OH}$  in Inorganic qualitative analysis?
- e) Define 'molecular formula'.

**Q5)** A) Answer any two of the following: [6]

- a) Explain the use of NaOH or KOH in the separation of group II cations in inorganic qualitative analysis.
- b) Explain the Liebig's method of estimating carbon and hydrogen in an organic compound.
- c) How is halogen from an organic compound detected using Lassaigen's test?

B) Answer any two of the following: [4]

- a) How are samples of gases obtained?
- b) Write a short note on 'indeterminate error'.
- c) Write note on borate ion removal scheme in inorganic qualitative analysis.

**Q6)** Solve any two of the following: [5]

- a) Following weights were obtained by a person on repeating the same experiments four times i.e. 22.3, 24.6, 21.0 and 23.4 mg. Calculate mean deviation and standard deviation.
- b) 0.438 gm of an organic compound gave 0.584 gm of AgBr. Find the percentage of bromine in the organic compound. [Given:- Molecular weight of AgBr = 188]
- c) A solution is  $1 \times 10^{-4}$  M in silver ion. What should be the concentration of  $\text{Cl}^\ominus$  ion to just cause the precipitation of AgCl. [Given  $K_{sp}$  for AgCl =  $1.1 \times 10^{-10}$ ]



Total No. of Questions :6]

SEAT No. :

[Total No. of Pages : 3

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**[5215] - 106**

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

**CHEMISTRY**

**CH - 212 : Organic and Inorganic Chemistry**

**(2013 Pattern) (Semester - I) (Paper - II)**

*Time : 2 Hours]*

*[Max. Marks :40*

*Instructions to the candidates:*

- 1) Answer of the two sections should be written on separate answer books.*
- 2) All questions are compulsory.*
- 3) Figures to the right indicate full marks.*
- 4) Neat diagrams must be drawn wherever necessary.*

**SECTION - I**

**Organic Chemistry**

**Q1)** Answer the following:

**[5]**

- a) Define the term enantiomers.
- b) Explain the term reaction mechanism.
- c) Draw geometrical structures of cis 1, 3 dimethyl cyclohexane.
- d) 2-bromobutane react with alcoholic KOH and gives 2-butene as a major product. Explain.
- e) Explain the Locking of conformation.

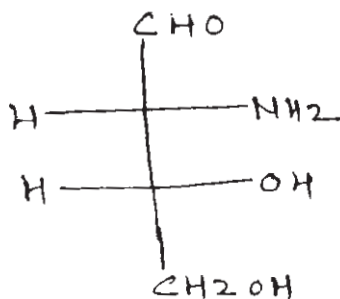
**Q2)** a) Attempt any two of the following:

**[6]**

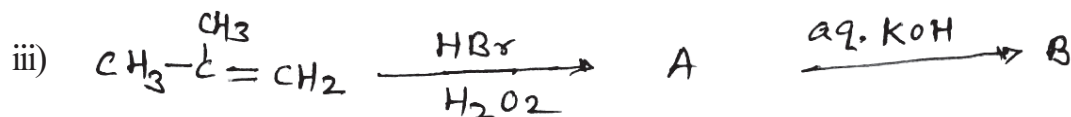
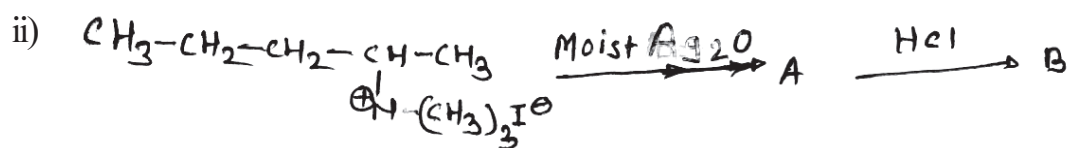
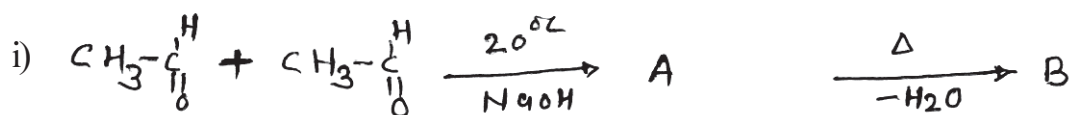
- i) What is  $SN_2$  reaction? Discuss the stereochemistry of  $SN_2$  reaction.
- ii) Draw the Newman projection for conformers of methyl cyclohexane and explain their stability.

**P.T.O.**

- iii) Define absolute configuration. Assign 'R' and 'S' configuration to the following



- b) Assign A and B of the following: (any two) [4]



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

- Explain Baeyer's strain theory.
- Discuss the mechanism of Hofmann rearrangement reaction.
- What is optical activity? Draw erythro and threo-isomers of 2, 3 - dichlorobutane.

**SECTION - II**  
**Inorganic Chemistry**

**Q4)** Answer the following: [5]

- a) Define the term smelting.
- b) Give the composition of cryolite.
- c) Name the metal used for galvanisation.
- d) What is Thomas slag?
- e) What is metal cladding?

**Q5) a)** Attempt any two of the following: [6]

- i) Explain with the help of neat diagram and chemical reaction acidic Bessemer process.
- ii) What is corrosion? Explain different type of corrosion.
- iii) Explain the electrolysis process to get aluminium from alumina with suitable diagram.

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

- i) Distinguish between roasting and calcination.
- ii) Write short note on leaching process.
- iii) What are advantages of L.D. process?

**Q6)** Attempt any two of the following: [5]

- a) Define the term electroplating. Explain galvanising process.
- b) Define pig iron. Draw the neat and labelled diagram of blast furnace.
- c) Define concentration of ore. Explain froth floatation process.



Total No. of Questions : 4]

SEAT No. :

**P392**

**[5215]-107**

[Total No. of Pages : 2

**S.Y. B.Sc.**

**BOTANY**

**BO - 211 :Taxonomy of Angiosperms and Plant Community  
(2013 Pattern) (Semester - I) (Paper - I)**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

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

**Q1)** Answer the following.

**[10]**

- a) What is botanical nomenclature?
- b) Write an example of Phylogenetic system of classification.
- c) What is monograph?
- d) Write a source of embryological data used in systematics.
- e) Name, the type of inflorescence in family Euphorbiaceae.
- f) What are mesophytes?
- g) Write any one name of National Herbarium.
- h) Define autecology.
- i) What is gynostegium?
- j) Write any one principle of ICBN.

**Q2)** Answer **any two** of the following:

**[10]**

- a) Give the merits of Bentham and Hooker's system of classification.
- b) Explain the role of anatomical data used in plant systematics.
- c) Describe the Pyramid of number.

**P.T.O.**

**Q3) Write notes on (any two) :**

**[10]**

- a) Economic importance of family Meliaceae.
- b) Use of computers in Taxonomy.
- c) Effective and valid Publication.

**Q4) Give Distinguishing characters, floral formula, floral diagram and Economic Importance of family Annonaceae.**

**[10]**

OR

What are Halophytes? Describe external and internal ecological adaptations in Halophytes.

**[10]**



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 1

**P393**

**[5215]-108**

**S.Y.B.Sc.**

**BOTANY**

**BO-212 : Plant Physiology**

**(2013 Pattern) (Semester-I) (Paper-II)**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

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

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

- a) Give any two applications of plant physiology in Biotechnology.
- b) Name any two non symbiotic N<sub>2</sub> fixing bacteria.
- c) Write any two properties of water.
- d) Enlist phases of growth.
- e) What is ascent of sap?
- f) Enlist any two factors affecting rate of water absorption.
- g) What are the types of seed dormancy?
- h) Who proposed the root pressure theory in ascent of sap.
- i) What is ammonification?
- j) What is capillary water?

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

- a) Write properties and practical applications of auxins.
- b) Explain metabolic changes occurring during seed germination.
- c) What is vernalization? Write its applications.

**Q3) Write note on any two : [10]**

- a) Transpiration pull theory.
- b) Symbiotic nitrogen fixation
- c) Short day plants.

**Q4) What is plasmolysis? Describe stages in plasmolysis and add a note on its significance. [10]**

OR

What is transpiration? Describe the mechanism of opening and closing of stomata. [10]

Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 2

**P394**

**[5215]-109**

**S.Y.B.Sc.**

**ZOOLOGY**

**ZY-211 - Animal Systematics and Diversity - III  
(2013 Pattern) (Semester - I) (Paper-I) (Revised)**

*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) What is madreporite?
- b) Write any two distinguishing characters of class Arachnida.
- c) What is Nauplius larva?
- d) Define metamorphosis in insects.
- e) Give any two shell modifications in Mollusca.
- f) Define Bivium.
- g) Mention the food of starfish.
- h) Write any two characters of class Myriapoda.
- i) Give the significance of mimicry.
- j) Give any two examples of class crustacea.

**Q2)** Write short notes on (Any two):

**[10]**

- a) Foot modification in Mollusca.
- b) Bipinnaria larva.
- c) Useful insects.

**P.T.O.**

**Q3)** Attempt the following (Any two):

**[10]**

- a) Write distinguishing characters of class Echinoidea.
- b) Sketch and label siphoning type of mouth parts.
- c) Describe pedicellariae in starfish.

**Q4)** Describe the digestive system of starfish and add a note on physiology of digestion. **[10]**

OR

Give general characters of phylum Arthropoda and distinguishing characters of class insecta. **[10]**



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 2

**P395**

**[5215]-110**

**S.Y.B.Sc.**

**ZOOLOGY (Regular)**

**ZY - 212 : Applied Zoology - I**

**(Fisheries and Agricultural Pests and Their Control)**

**(2013 Pattern) (Paper - II) (Semester - I) (Revised)**

*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 side indicate full marks.*

**Q1)** Attempt the following:

**[10]**

- a) What is Fresh water Fishery?
- b) Mention any two veterinary pests.
- c) What is long form of IPM?
- d) What is pheromonal pest control?
- e) What is Ising Glass?
- f) What is composite fish culture?
- g) Mention any two hazards of pesticides on man.
- h) Write the names of equipments used for harvesting Mackerel.
- i) Mention any two damages caused by pulse beetle.
- j) What is Nursery pond?

**Q2)** Write short notes on (Any two)

**[10]**

- a) Chilling and drying techniques in fish preservation.
- b) Describe the harvesting method of Bombay duck.
- c) Rats and squirrels as non insect pests.

**P.T.O.**

**Q3)** Attempt the following (Any two)

**[10]**

- a) Describe in brief knapsack sprayer.
- b) Sketch and label - DoI Net.
- c) Describe in brief Biological control.

**Q4)** Describe marks of identification. Nature of damage and control measures of jowar stem borer and Mango stem borer. **[10]**

OR

Describe Habits, Habitat and culture methods of Labeo rohita and macrobrachium rosenbergii (Giant Prawn)

**x      x      x**

Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 1

**P396**

**[5215]-111**

**S.Y.B.Sc.**

**GEOLOGY**

**GL-211 : Mineralogy**

**(2013 Pattern) (Paper-I) (Semester-I)**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

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

**Q1)** Answer the following questions in 2/3 lines.

**[10]**

- a) What are crystalline minerals?
- b) What is phyllosilicate structure?
- c) What is foreign overgrowth?
- d) Define hemimorphic form.
- e) What is perthite?
- f) Define twin plane.
- g) What is symmetrical extinction.
- h) What is dichroism?
- i) Give the chemical composition of hauyene-nosean.
- j) Give the properties of quartz in between crossed nicols.

**Q2)** Write notes on (any two).

**[10]**

- a) Causes of twinning.
- b) Main attributes of gemstone.
- c) Give the silicate structure and composition of olivine.

**Q3)** Explain the following (any two).

**[10]**

- a) Phenomenon of interference colours.
- b) Optical properties and paragenesis of mica
- c) Properties of tourmalene and topaz as gemstones.

**Q4)** Describe the structure, mineral composition, physical & optical properties and paragenesis of pyroxene mineral group.

**[10]**

OR

Give the crystallographic axis, elements of symmetry and forms present with indices hexagonal system type calcite, quartz and tourmalene.

Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages :2

**P397**

**[5215]-112**

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

**GEOLOGY**

**GL-212 : Structural Geology**

**(2013 Pattern) (Paper-II) (Semester - I)**

*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 right indicate full marks.*

**Q1)** Answer the following questions.

**[10]**

- a) Define Reverse fault.
- b) Define Strike of a bed.
- c) Define anticline.
- d) Define plunging fold.
- e) Define dip joints.
- f) Define 'Foot wall' of fault.
- g) Define structural Geology.
- h) What is outlier?
- i) Define dome?
- j) Define disconformity.

**Q2)** Write notes on (ANY TWO).

**[10]**

- a) Recumbent and overturned folds.
- b) Genetic classification of joints.
- c) Normal and thrust fault.

**Q3)** Answer the following questions (ANY TWO).

**[10]**

- a) Write a note on angular unconformity and disconformity.
- b) Write a note on applications of brunton compass.
- c) Write a note on significance of graded and cross bedding in identifying the top of the bed.

**P.T.O.**

**Q4)** Describe the terms associated with fault. Explain the types of movements along fault and enumerate the criteria of recognising faults in the field. **[10]**

OR

Define fold. Explain with suitable example, recognition of folds by plotting attitude of beds on a map.



Total No. of Questions :4]

SEAT No. :

**P398**

[Total No. of Pages : 4

**[5215] - 113**

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

**STATISTICS**

**ST - 211 : Discrete Probability Distributions, Time Series and**

**R - Software**

**(2013 Pattern) (Paper - I) (Semester - I)**

*Time : 2 Hours]*

*[Max. Marks :40*

*Instructions to the candidates:*

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

**Q1)** Attempt each of the following:

- A) Choose the correct alternative in each of the following: **[1 each]**
- a) Negative binomial distribution is
    - i) Positively skewed and platykurtic
    - ii) Positively skewed and leptokurtic
    - iii) negatively skewed and platykurtic
    - iv) negatively skewed and leptokurtic
  - b) If the time series values change at a constant rate over a long period of time then its trend is represented by
    - i) parabolic curve
    - ii) exponential curve
    - iii) straight line
    - iv) none of the above

**P.T.O.**

c) Rank of variance - covariance matrix of MD ( $n, p_1, p_2, p_3, p_4$ ) is

i) 1

ii) 2

iii) 3

iv) 4

B) State whether each of the following is True or False: **[1 each]**

a) If  $X \rightarrow \text{NB } (k = 3, p = 0.4)$  then

$$P(X = 3) = P(X = 2).$$

b) If  $X \rightarrow B(n, p)$  and  $X_T \rightarrow B(n, p)$ , truncated to the left at zero then  $E(X_T) < E(X)$ .

c) The method of moving averages can be used for forecasting purpose.

C) Write the R-command to repeat the element 4 six times. **[1]**

D) State the first order autoregressive model. **[1]**

E) Give one real life situation where multinomial distribution is applicable. **[1]**

F) State the probability mass function of truncated Poisson distribution, truncated to the left at zero. **[1]**

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

a) What is a time series? Explain seasonal variations and cyclical variations in time series analysis.

b) If  $X_T$  is a binomial random variable with  $n = 5$  and  $p = 0.4$ , truncated to the left at zero,

Find i)  $P(X_T = 4)$

ii)  $P(X_T \leq 2)$ .

- c) Let  $(X_1, X_2, \dots, X_k) \rightarrow \text{MD}(n, p_1, p_2, \dots, p_k)$ . Obtain the joint moment generating function (m.g.f.) of  $(X_1, X_2, \dots, X_k)$  and hence find the probability distribution of  $X_1 + X_2$ .

**Q3)** Attempt any two of the following:

**[5 each]**

- a) Write a note on double exponential smoothing using Holt - Winter's method.
- b) If  $(X_1, X_2, X_3) \rightarrow \text{MD}(n, p_1, p_2, p_3)$  then show that partial correlation coefficient  $r_{12.3}$  is equal to  $-1$ .
- c) Give the output of the following R-commands.

i) `> m = 1 : 4`

`> n = m * m`

`> data.frame(m, n)`

ii) `> x = c(24, 48, 69, 13, 12)`

`> x[c(-1, -3)]`

iii) `> x = c(11, 13, 20, 12)`

`> a = 10`

`> x - a`

iv) `> y = 1 : 10`

`> length(y)`

v) `> z = seq(1, 15, 2)`

`> z`

**Q4)** Attempt any One of the following:

a) i) If  $X \rightarrow B(10, 0.4)$  then write R - commands of find its median and to draw a random sample of size 10 from it. **[2]**

ii) Estimate the trend values using exponential smoothing with smoothing factor  $\alpha = 0.1$  for the following time series: **[5]**

| Year (t) | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|----------|------|------|------|------|------|------|
| $Y_t$    | 34   | 38   | 40   | 42   | 43   | 45   |

iii) If  $(X_1, X_2, X_3, X_4) \rightarrow MD(12, 0.2, 0.3, 0.4, 0.1)$  find  $P(X_1 = 4 | X_3 = 5)$ . **[3]**

b) i) Obtain mean and variance of NB(k, p) distribution. **[6]**

ii) Describe the method of simple averages for computing seasonal indices. Discuss its merits and demerits. **[4]**



Total No. of Questions : 4]

SEAT No. :

**P399**

[Total No. of Pages : 3

**[5215] - 114**

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

**STATISTICS**

**ST - 212 : Continuous Probability Distributions**

**(2013 Pattern) (Paper - II) (Semester - I) (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) *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]**

a) If moment generating function (m. g. f.) of a continuous random variable (r, v)  $X$  is  $M_x(t)$  then m.g.f. of  $Y = 3x + 5$  is

- |                        |                       |
|------------------------|-----------------------|
| i) $e^{3t} M_x(5t)$    | ii) $e^{5t} M_x(3t)$  |
| iii) $e^{-3t} M_x(5t)$ | iv) $e^{-5t} M_x(3t)$ |

b) If  $X \rightarrow n(\mu, \sigma^2)$  with fourth central moment 27 then its second central moment is

- |        |        |
|--------|--------|
| i) 1   | ii) 3  |
| iii) 9 | iv) 27 |

c) The first quartile of  $\text{Exp}(\dot{2})$  distribution is

- |                                                  |                                                 |
|--------------------------------------------------|-------------------------------------------------|
| i) $2\log_e\left(\frac{4}{3}\right)$             | ii) $2\log_e\left(\frac{3}{4}\right)$           |
| iii) $\frac{1}{2}\log_e\left(\frac{4}{3}\right)$ | iv) $\frac{1}{2}\log_e\left(\frac{3}{4}\right)$ |

**P.T.O.**

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

a) If  $X$  is a continuous r.v. with p.d.f.  $f(x)$  then p.d.f. of  $Y = 2X$  is

$$h(y) = \frac{1}{2} f(y).$$

b) If  $E(XY) = E(X) \cdot E(Y)$  then  $X$  and  $Y$  are independent.

c) Gamma distribution is positively skew and leptokurtic.

C) Find median of  $U(0, 1)$  distribution. **[1]**

D) State central limit theorem for independent and identically distributed random variables with finite positive variance. **[1]**

E) Give a real life illustration of continuous sample space. **[1]**

F) If  $(X, Y)$  is a two - dimensional continuous r.v. then define its central moment of order  $(r, s)$ . **[1]**

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

a) A continuous r.v.  $X$  has p.d.f.

$$f(x) = \frac{2}{x^3}, x \geq 1$$

$$= 0, \text{ otherwise.}$$

Find (i) Mean (ii) median and (iii) mode of  $X$

b) The joint p.d.f. of  $(X, Y)$  is

$$f(x, y) = 2e^{-(x+y)}, 0 \leq y \leq x \leq s$$

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

i) Find marginal p.d.f. of  $X$  and marginal p.d.f. of  $Y$ .

ii) Verify whether  $X$  and  $Y$  are independent.

c) If  $X \rightarrow P(m)$  and  $Y \rightarrow E(1, X + 1)$ , where  $k$  is a positive integer, show that  $P(X \leq k) = P(Y \geq m)$ .

**Q3)** Attempt any two of the following:

**[5 each]**

- a) Find m.g.f. of  $N(\mu, \sigma^2)$  distribution and hence find its first two raw moments.
- b) If  $X$  and  $Y$  are independent standard normal variates then show that  $U = X + Y$  and  $V = X - Y$  are independently distributed. Also, identify, the distribution of  $U$  and  $V$ .
- c) A continuous r.v.  $X$  has p.d.f.

$$f(x) = 6x(1 - x), 0 < x < 1,$$
$$= 0, \text{ otherwise.}$$

Find the first three raw moments and the third central moment of the distribution.

**Q4)** Attempt any One of the following:

- a) i) Find mean deviation about mean of exponential distribution with parameter  $\alpha$ . **[6]**
- ii) If  $X \rightarrow N(10, \sigma^2)$  so that  $P(X > 12) = 0.1587$ , find  $P(9 < X < 11)$ . **[4]**
- b) i) The joint p.d.f. of  $(X, Y)$  is

$$f(x, y) = 24xy, x > 0, y > 0, x + y \leq 1$$
$$= 0, \text{ otherwise.}$$

Find  $\text{Var}(X|Y = y)$ . **[7]**

- ii) If  $X$  is uniformly distributed with mean 1 and variance 3, find  $P(X < 1)$ . **[3]**



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P400**

**[5215] - 115**

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

**GEOGRAPHY**

**Gg-211: Geography of Resources - I  
(2013 Pattern) (Semester - I) (Paper - I)**

*Time : 2 Hours]*

*[Max. Marks :40*

*Instructions to the candidates:*

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Draw neat diagrams and sketches wherever necessary.*
- 4) Use of map stencils is allowed.*

**Q1)** Answer the following questions in two to three sentences each (Any Ten)[10]

- a) Define the term resource.
- b) What are the components of natural resources?
- c) Classify the resources on the basis of stage of development.
- d) Give any two examples of abiotic renewable resources.
- e) Name any four plant species of temperate forest.
- f) Name any four causes of deforestation.
- g) Name the various sources of water.
- h) Give any two methods of water conservation in industrial sector.
- i) Give any two causes of land degradation.
- j) Write any two methods of conservation of land.
- k) Name any two artificial sources of water for agriculture.
- l) Give any two examples of land degradation due to deforestation.
- m) Name any two ocean water routes.

***P.T.O.***

**Q2)** Write short notes on the following (Any Two) : **[10]**

- a) Importance of study of resources.
- b) Importance of abiotic non-renewable resources.
- c) Water as a resource.
- d) Importance of land resources.

**Q3)** Answer the following questions in 100 words each (Any Two) **[10]**

- a) Describe the components of resources.
- b) Explain the remedial measures to conserve forest resources.
- c) What are the different methods of water conservation.
- d) Describe the various causes of land degradation.

**Q4)** Answer the following question in 200 words (Any One) **[10]**

- a) Explain the importance of biotic and abiotic renewable resources.
- b) Explain the causes and effects of deforestation.



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P401**

**[5215] - 116**

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

**GEOGRAPHY**

**Gg-212: Watershed Management - I  
(2013 Pattern) (Semester - I) (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 stencils is allowed.*

**Q1)** Answer the following questions in two or three sentences each (Any Ten);[10]

- a) Define Watershed.
- b) What is meant by surface run-off?
- c) What is evapotranspiration?
- d) Name any two processes of soil erosion due to water.
- e) What is drainage density?
- f) What is Water Budget?
- g) What do you mean by linear aspect?
- h) Name any two problems in watershed management.
- i) What is stream length ratio?
- j) Define hydrological Cycle.
- k) What is channel slope.
- l) Name the types of precipitation.
- m) Write any two objectives of watershed management.

***P.T.O.***

**Q2)** Write short notes on the following (Any Two):

**[10]**

- a) Need for land capability classification.
- b) Relief aspects of drainage basin.
- c) Principles of watershed management.
- d) Infiltration.

**Q3)** Answer the following questions in 100 words each (Any Two):

**[10]**

- a) Explain water budget in detail.
- b) Describe Geomorphological characteristics of watershed.
- c) Explain soil erosion due to water.
- d) Describe need for land capability classification.

**Q4)** Answer the following questions in 200 words each (any one):

**[10]**

- a) What is soil erosion? Describe soil erosion due to wind.
- b) Explain the problems of watershed management in detail.



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P402**

**[5215] - 117**

**S.Y.B.Sc.**

**MICROBIOLOGY (Regular)**

**MB : 211 - Bacterial Systematics & Physiology  
(2013 Pattern) (Theory) (Paper - I) (Semester - I)**

*Time : 2 Hours]*

*[Max. Marks :40*

*Instructions to the candidates:*

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

**Q1)** Attempt the following :

**[10]**

- a) Define coenzyme with example.
- b) Enlist any two High energy compounds.
- c) State true or false:
  - I) Fermentation process yields more energy than respiration.
  - II) Enzymes reduce activation energy.
- d) What is an active site of an enzyme.
- e) Give formula to calculate % similarity.
- f) Define 'Dendogram'.
- g) What is role of enzymes belonging to 'Ligases'?
- h) Draw the structure of 'Glyoxylate'.
- i) Catalase belongs to \_\_\_\_\_ class of enzymes.

**P.T.O.**

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

- a) Schematic representation of ED pathway with structures & enzymes involved in it.
- b) Role of % G+ C content in bacterial classification.
- c) Describe Hydrolase class of enzymes with two examples.

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

- a) Describe the effect of inhibitors on enzyme activity.
- b) What are radioisotopes? Describe role of 'Autoradiography' in study of metabolic pathways.
- c) Describe electron transport chain in oxidative phosphorylation.

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

- a) Describe citric acid cycle with structure, and enzymes involved in it. Add a note on its amphibolic nature.
- b) What is chemotaxonomy? Justify: Protein and Lipid profile of bacteria helps in its classification.



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P403**

**[5215] - 118**

**S.Y.B.Sc.**

**MICROBIOLOGY**

**MB - 212: Industrial and Soil Microbiology  
(2013 Pattern) (Semester - I) (Theory) (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 labelled diagrams and sketches wherever necessary.*

**Q1)** Answer the following.

**[10]**

- a) Enlist any two fungal biocontrol agents.
- b) What is a role of sparger in fermenter?
- c) Enlist any two buffers used in fermentation process.
- d) What is continuous fermentation? Give any one example.
- e) Enlist any two micro organisms involved in pectin degradation.
- f) Write any two examples of free living Nitrogen fixing microbes.
- g) What is competition type of microbial interaction.
- h) Give the role of bacteria in nitrification process.
- i) State whether true or false - conversion of starch to alcohol is dual fermentation.
- j) What is seed culture?

**P.T.O.**

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

- a) Describe secondary screening process.
- b) Describe the role of precursors in fermentation process.
- c) Describe the composition and types of soil.

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

- a) What is microbial interaction? Describe symbiosis in detail.
- b) Describe aeration and agitation in fermentation process.
- c) What are biofertilisers? Describe micro organisms involved, media used and flowsheet for large scale production of cyanobacterial biofertiliser.

**Q4)** Describe different Nitrogen sources used in fermentation media preparation. [10]

OR

What is biogeochemical cycle? Describe phosphorous and sulphur cycle in detail.



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 1

**P404**

**[5215]-119**

**S.Y.B.Sc.**

**PSYCHOLOGY**

**EP - 211 : Psychology of Adjustment  
(2013 Pattern) (New Course) (Semester-I) (Paper-I)**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

- 1) Attempt all questions.*
- 2) Draw the figures and diagrams wherever necessary.*
- 3) Figures to the right indicate full marks.*

**Q1)** Answer in two or four sentences.

**[16]**

- a) Define adjustment.
- b) What is marriage?
- c) What is career decision?
- d) What is abnormal behaviour?
- e) Define job stress.
- f) Define Divorce.
- g) Define unemployment.

**Q2)** Answer any two of the following in eight or ten sentences.

**[8]**

- a) Describe the stages of family life cycle?
- b) Explain the approaches of psychology of adjustment.
- c) Explain an overview of DSM.IV

**Q3)** Write short note on any two of the following.

**[8]**

- a) Anxiety disorder.
- b) Marital adjustment.
- c) Happiness.

**Q4)** a) Enumerate Predictors of marital success?

**[8]**

OR

- b) What is personality disorder ? Describe in detail the types of personality disorders?

Total No. of Questions : 4]

SEAT No. :

**P405**

[5215]-120

[Total No. of Pages : 1

**S.Y.B.Sc.**

**PSYCHOLOGY**

**EP-212 : Experimental Psychology and Research Methodology  
(2013 Pattern) (Semester-I) (Paper-II)**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

- 1) Attempt all questions.*
- 2) Neat figures and diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*

**Q1)** Answer in one to four sentences.

**[16]**

- a) Define Conditioning.
- b) What is problem solving?
- c) What is hypothesis?
- d) What is interview?
- e) What is Experimental Psychology?
- f) What is questionnaire?
- g) What is abstraction?
- h) Define thinking.

**Q2)** Answer any two of the following in 8/10 sentences.

**[8]**

- a) Explain validity in Research.
- b) Explain Instrumental conditioning.
- c) Explain trial and error in thinking.

**Q3)** Write short notes on any two of the following.

**[8]**

- a) Mental image.
- b) Reinforcement.
- c) Characteristics of a good research.

**Q4)** What is observation? Explain the types of observation.

**[8]**

**OR**

What is scientific research? Explain the steps of scientific research.

Total No. of Questions : 4]

SEAT No. :

**P406**

[5215]-123

[Total No. of Pages : 2

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

**ELECTRONIC SCIENCE**

**EL-211: Analog Circuit Design**

**(2013 Pattern) (Semester - I) (Paper-I)**

*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)** Answer all of the following:

- a) Define voltage gain of an amplifier. [1]
- b) What is thermal runaway? [1]
- c) Define feedback in amplifier. [1]
- d) State Barkhausen criterion to get sustained oscillations. [1]
- e) “Transformer coupled power amplifier is preferred at the final stage of multistage amplifier.” Comment. [2]
- f) “Active filters are better than passive filters”. Comment. [2]
- g) Calculate the cutoff frequency of high pass filter with  $R = 10\text{ K}\Omega$ ,  $C = 0.01\text{ }\mu\text{F}$ . [2]
- h) In transistor amplifier with CE mode, if  $R_C = 4\text{ K}\Omega$ ,  $R_E = 5\text{ K}\Omega$  and  $V_{CC} = 30\text{ volt}$ . Draw dc load line. [2]

**Q2)** Answer any two of the following:

- a) With the help of block diagram, discuss the multi-stage amplifier and state its applications. [4]
- b) Explain the working of phase-shift oscillator circuit. [4]
- c) Draw the circuit diagram of an integrator using OPAMP. Derive the expression for its output voltage. [4]

**P.T.O.**

**Q3)** Answer any two of the following:

- a) With the help of neat diagram, explain class A power amplifier with resistive load and show that its collector efficiency is 25%. [4]
- b) What is positive feedback? Obtain an expression for gain of it. [4]
- c) Explain the working of differential amplifier with constant current source. [4]

**Q4)** Answer all of the following:

- a) Discuss the steps to design single stage class-A amplifier in audio range. [6]
- b) Explain the effect of –ve feedback on [6]
  - i) Gain
  - ii) Distortion of an amplifier

OR

**Q4)** Answer all of the following.

- a) Design voltage to current converter using OPAMP for output current 1 mA with input voltage 5V. [4]
- b) In power transistor, junction temperature ( $T_{j\max}$ ) is 90°C and thermal resistance ( $\theta$ ) is 8°C/W, at an ambient temperature 50°C, calculate power dissipation of it. [4]
- c) Find the co-ordinates of ‘Q’ point in CE amplifier using silicon transistor. [4]

Given:  $V_{CC}=9V$ ,  $R_1 = 10\text{ K}\Omega$ ,  $R_2 = 5\text{ K}\Omega$ ,

$$R_C = 1\text{ K}\Omega, R_E = 2\text{ K}\Omega$$



Total No. of Questions : 4]

SEAT No. :

**P407**

**[5215]-124**

[Total No. of Pages : 2

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

**ELECTRONIC SCIENCE**

**EL - 212 : Digital Circuit Design**

**(2013 Pattern) (Paper - II) (Semester - I)**

*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 all of the following:

- a) Define Linearity of ADC. [1]
- b) Determine time delay in an 8bit 7491A SISO if  $T = 100$  microsec. [1]
- c) Define sequential logic circuit. [1]
- d) What is maxterm or standard sum? [1]
- e) Priority encoder is special type of encoder, - comment. [2]
- f) Dual slope ADC is more advantages to single slope ADC, - comment. [2]
- g) Determine load voltage in an electromagnetic relay if  $I_L = 10A$ , supply voltage = 12 v and voltage drop across contacts is 2v. [2]
- h) Draw state diagram and truth table of MoD - 5 counter. [2]

**Q2)** Attempt any two of the following:

- a) Describe the working of tracking A to D converter with the help of block diagram. [4]
- b) Draw block diagram and discuss auto parking system. [4]
- c) What is modulo N counter? Draw logic diagram of mod - 10 counter along with its timing diagrams. [4]

**P.T.O.**

**Q3)** Attempt any two of the following:

- a) Discuss in brief weighted resistor network type digital to Analog converter. [4]
- b) Draw block diagram and explain two digit Bank token display application. [4]
- c) Explain ring counter as a sequence generator. [4]

**Q4)** Attempt all of the following:

- a) Design two bit magnitude comparator using K - map, write its truth table. [6]
- b) Draw block diagram of 3bit up/Down counter and discuss its timing diagrams. [6]

OR

- a) Calculate average conversion time for a 10 bit counter type A/D converter using 1MHz clock. [4]
- b) Given 4 bit R-2R resistor ladder with reference voltage 20V. Calculate output voltage for 0001, 0010, 0110, 1101 cases. [4]
- c) What will be the output of 4 bit magnitude comparator using IC 7485 if A = 1010 and B = 1011. Draw its logic diagram. [4]

**x x x**

Total No. of Questions : 4]

SEAT No. :

**P408**

[5215]-125

[Total No. of Pages : 1

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

**DEFENCE AND STRATEGIC STUDIES**

**DS- 101: Study of Conflict and Peace  
(2013 Pattern ) (Semester-I) (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 in two to Four sentences.

**[8 × 2 =16]**

- a) Define world system.
- b) What are the methods of pacific settlement?
- c) Define cultural integration.
- d) What do you mean by Nation-State?
- e) What do you mean by self determination?
- f) What do you mean by changing world order?
- g) Define conflict management.
- h) Define conflict resolution.

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

**[2 × 4 = 8]**

- a) Describe historical background of war studies.
- b) Discuss scope of conflict studies.
- c) Discuss problems of peace building in 21<sup>st</sup> century.

**Q3)** Write short notes on (Any two).

**[2 × 4 = 8]**

- a) Role of civil society in peace building.
- b) Role of War in Peace Research.
- c) Conflict transformation across cultures.

**Q4)** Answer in 18 to 20 sentences (Any one).

**[1 × 8 = 8]**

- a) Describe characteristics of conflicts within the state.
- b) Discuss clash of civilization in contemporary world order.



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages : 2

**P409**

**[5215] - 126**

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

**DEFENCE AND STRATEGIC STUDIES**

**DS -102 : Military Geography**

**(2013 Pattern) (Semester - I) (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.*

**Q1)** Answer in 2 or 4 sentences each:

**[16]**

- a) Define 'Logistics'.
- b) Why the study of Desert Warfare is essential for us?
- c) Define "Tactics".
- d) What was the grand strategy of Shivaji?
- e) What do you understand by "Nuclear Warfare?"
- f) State any two types of Disaster.
- g) State the ideal period for High, Attitude warfare.
- f) What do you mean by "Military Geography"?

**Q2)** Answer in 8 to 10 sentences (Any Two)

**[8]**

- a) Explain the concept of "Civil Defence".
- b) Write in brief scope of Military Geography.
- c) Explain any one example of "Strategy" during war.

**P.T.O.**

**Q3)** Write short notes on [Any Two]

**[8]**

- a) Tactics of Shivaji.
- b) Any one Resource of logistics.
- c) Tactical problems of Jungle warfare.

**Q4)** Answer in 16 to 20 sentences (Any One)

**[8]**

- a) Highlight on the process of formation of grand strategy.
- b) Explain the use of environmental factors during war.



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P410**

**[5215] - 127**

**S.Y.B.Sc.**

**DEFENCE AND STRATEGIC STUDIES**

**DS. No.-103: Contemporary Strategy  
(2013 Pattern) (Semester - I) (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.*

**Q1)** Answer in 2 or 4 sentences each.

**[16]**

- a) Define “Strategy”.
- b) What do you mean by “National Security”?
- c) State the meaning of “Deterrence”.
- d) What do you understand by “C.B.M.”?
- e) Write the meaning of “war”.
- f) When & where the “Nuclear Bomb” it was dropped?
- g) What do you mean by “Nuclear Strategy”?
- h) State any two components of National Security Strategy.

**Q2)** Answer in 8 to 10 sentences. [Any two]

**[8]**

- a) Write in brief “Conventional war”.
- b) What do you mean by “strategic thinking”?
- c) Explain in short “Aerospace Strategy”.

**P.T.O.**

**Q3)** Write short notes on [Any two]

**[8]**

- a) Flexible Response.
- b) Nuclear Deterrence.
- c) Formulation of Strategies.

**Q4)** Answer in 16 to 20 sentences [Any one]

**[8]**

- a) Explain the various causes of war with relevant examples.
- b) Discuss any one component of National Security Strategy.



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 2

**P411**

**[5215]-128**

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

**ENVIRONMENTAL SCIENCE**

**ENV - 201 : Ecology & Ecosystem**

**(2013 Pattern) (Paper - I) (Semester - I) (New Course)**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Neat and labelled 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) Define : Biome and give one example of it.
- b) State the difference between photosynthesis & Respiration.
- c) What are Ecological pyramids? Mention its types.
- d) What is Nutrient budget?
- e) Write the difference between gross & Net Productivity.
- f) What is meant by carrying capacity of environment.
- g) Define : Ecological succession.
- h) State the difference between potential & realised natality.
- i) Define the term : Ecological niche.
- j) What is Interspecific relationship? Write its types.

**Q2)** Write a short note on (Any two)

**[10]**

- a) Hydrosere with diagram.
- b) Nitrogen cycle with flow chart.
- c) Energy flow in an ecosystem.

**P.T.O.**

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

- a) Describe the productivity of an ecosystem.
- b) Explain any five population characteristics with diagram.
- c) Write about the basic types of Ecological succession and add a note on its mechanism.

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

- a) Explain in detail Analytical characters used in community structure.
- b) Discuss the interdisciplinary nature of ecology with historical overview. Add a note on its levels of organisation.

**x      x      x**

Total No. of Questions : 4]

SEAT No. :

**P412**

**[5215]-129**

[Total No. of Pages : 2

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

**ENVIRONMENTAL SCIENCES**

**EVS - 202: Natural Resources, Energy & their Management  
(2013 Pattern) (Semester - I) (Paper - II) (New Course)**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

- 1) All questions are compulsory and carry equal marks.*
- 2) Neat and labelled 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) Mention any two methods of water conservation.
- b) Write any two benefits associated with nuclear energy.
- c) What are artificial resources?
- d) Write full form for 'HYV'.
- e) What is the principle behind production of hydro energy?
- f) What is meant by 'Resource'?
- g) Mention any two problems associated with soil resource.
- h) Which are the reasons behind energy crisis?
- i) Write any two important aspects of energy audit.
- j) What is meant by 'Sustainable Agriculture'?

**Q2)** Write a short note on ANY TWO of the following:

**[10]**

- a) Geothermal Energy
- b) Solar Energy
- c) World Food Problem

**P.T.O.**

**Q3)** Answer ANY TWO questions from the following:

**[10]**

- a) Discuss the ecological significance of forest resources.
- b) Write an account on soil conservation methods.
- c) Which are the problems associated with modern agriculture?

**Q4)** Attempt ANY ONE of the following:

**[10]**

- a) What are the reasons behind scarcity of water? Also add a note on conflicts over water in world.
- b) Which are various ways of generating bioenergy? Also add a note on objectives of energy management.



Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages : 6

**P413**

**[5215]-130**

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

**ENGLISH (Optional)**

**Text book : Literary Vistas  
(2013 Pattern) (Semester - I) (Revised)**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

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

**Q1) a)** Attempt any one of the following in about 100 words. **[5]**

- i) Why is Saturn said to be a world in the making?
- ii) State how the pre-Christian attitude to disease is contrasted with that of the scientist?

**b)** Attempt any one of the following in about 100 words. **[5]**

- i) Why is the television a unique medium according to Jerzy Kosinski?
- ii) Explain the theme of the lesson 'The Sun, the Planets and the Stars'.

**Q2) a)** Attempt any one of the following in about 100 words. **[5]**

- i) How does the poem Purdah (1) Bring out the loss of self and objectification of girls?
- ii) What, according to Longfellow, is the purpose of our lives?

**b)** Attempt any one of the following in about 100 words. **[5]**

- i) The 'Purdah' is about every women: do you agree? Give reasons.
- ii) What is the theme of the poem 'A Psalm of Life'?

**P.T.O.**

**Q3)** Attempt any five of the following.

**[10]**

a) Complete the following sentences with an appropriate word chosen from those in brackets.

- i) I \_\_\_\_\_, if I can leave the office early tomorrow. (Suspect, doubt).
- ii) This is a \_\_\_\_\_ point, so we have to discuss it. (Moot, mute)

b) Combine words from A and B to form commonly used collocation.

| A             | B        |
|---------------|----------|
| i) Fulfill    | material |
| ii) Dress     | a dream  |
| iii) Building | identity |
| iv) Cultural  | code     |

c) Choose the right combinations of words.

- i) have a conversation / make a conversation.
- ii) Opposite statement / contradictory statement.

d) Differentiate between the following pairs of words and make sentences.

- i) Advice, advise.
- ii) Fair, fare.

e) Pick out the closest and antonym of the underlined words.

- i) Ambiguity : clarity, guilt, liveliness.
- ii) Diffident : confident, difficult, tolerant.

f) Add suffixes or prefixes to the words in the bracket to form meaningful sentence.

- i) Rakesh is a \_\_\_\_\_ son. (duty).
- ii) I think the test is scientifically \_\_\_\_\_ (sound)

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

**[10]**

- a) Magnets\_\_\_\_\_ (attract) iron filings.  
(Use correct form of the verb given in the bracket)
- b) Kalidas\_\_\_\_\_ (be) a great poet. He lived 2000 years ago.  
(Use correct form of the verb given in the bracket)
- c) Farid found the house locked, so he waited outside for his friend.  
(Change into simple sentence)
- d) It was not dark even at seven in the evening.  
(Change into complex sentence)
- e) Could you open the door, please?  
(Change into imperative sentence)
- f) I cannot help you.  
(Change into affirmative sentence)
- g) Someone might have left the door open last night.  
(Change into passive voice)
- h) Aniket cycles to college every day.  
(Change into interrogative sentence)
- i) The dogs have not been fed today.  
(Change into active voice)
- j) The house looks beautiful.  
(Change into a exclamatory sentence)
- k) Jack said, "I am returning to London next Sunday."  
(Change into reported speech)
- l) The Moon can be seen through the clouds.  
(Change into a negative sentence)



Total No. of Questions : 4]

**P413**

**[5215]-130**  
**S.Y.B.Sc. (Regular)**  
**ENGLISH (Optional)**  
**(2013 Pattern) (Semester - I) (Old)**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

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

- Q1)** a) Attempt any one of the following in about 100 words. **[5]**
- i) How does C.Jones describe the planets that exist in our solar system?
  - ii) How has the development in the science of medicine helped Civilisation?
- b) Attempt any one of the following in about 100 words. **[5]**
- i) What kind of energy is heat ? How does heat energy help the world?
  - ii) What are the important causes which helped civilised humans to live longer than the civilised ones?
- Q2)** a) Attempt any one from the following in about 100 words. **[5]**
- i) Is television a babysitter? Support your answer with examples.
  - ii) How did Rosemary react to Philip's admiration of Miss. Smith?
- b) Attempt any one of the following in about 100 words. **[5]**
- i) How does the narrator react to the changes made to his features in the photograph?
  - ii) What are the problems that children who are 'at the mercy of 5 to 6 hours of TV a day' face when they move into the real world?
- Q3)** Attempt the following (any five). **[10]**
- a) Complete the following sentences with an appropriate word chosen from those in bracket.
- i) Have you seen the new \_\_\_\_\_ shop. (stationary, stationery)
  - ii) She liked all the bags \_\_\_\_\_ the green one.(except, accept)

- b) Combine words from 'A' & 'B' to form commonly used collocations.
- | 'A'          | 'B'    |
|--------------|--------|
| i) Bottom    | list   |
| ii) Open     | farm   |
| iii) Dairy   | line   |
| iv) Shopping | minded |
- c) Differentiate between the following pairs of words & make sentences.
- i) beside, besides.
  - ii) fair, fare
- d) Choose the right combination of words:
- i) Have a conversation / make a conversation.
  - ii) Gossip writer / gossip columnist.
- e) Pick out the word that is the closest antonym of the underlined words.
- i) Ambiguity : clarity, guilt, liveliness.
  - ii) Consent : resent, permit, forbid.
- f) Add prefixes or suffixes to the words in brackets and rewrite the sentences:
- i) Chetan is a \_\_\_\_\_ son (duty)
  - ii) I think the test is scientifically \_\_\_\_\_ (sound)

**Q4)** Attempt the following : (any ten)

**[10]**

- a) Computers \_\_\_\_\_ (store) large amount of data.  
(Use correct form of the verb given in bracket)
- b) My sister is a writer, she \_\_\_\_\_ (write) novels.  
(Use correct form of the verb given in the bracket)
- c) If you don't like the pink sari, you can take the white one.  
(Change into a compound sentence)
- d) The e-mail that I sent Rajesh bounced.  
(Change into a simple sentence)
- e) The squirrels hid the nuts in a hole at the bottom of the tree.  
(Change into a complex sentence)

- f) Is the water cold?  
(Change into a declarative sentence)
- g) The mountain looks beautiful.  
(Change into exclamatory)
- h) It is too hot to go out.  
(Change into negative sentence)
- i) The dogs have not been fed today.  
(Change into active voice)
- j) The office is giving us a housing loan.  
(Change into passive voice)
- k) We have not had enough rain this year.  
(Change into an interrogative sentence)
- l) Hasan said, "I'm returning to Nagpur next Saturday".  
(Change into reported speech)



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S.Y. B.Sc. (Theory) (Semester - I)

मराठी (MARATHI)

पाठ्यपुस्तक : “विज्ञानसृष्टी” (मराठी विज्ञान साहित्य)  
(2013 पॅटर्न)

वेळ : 2 तास]

[ एकूण गुण : 40

- सूचना : 1) सर्व प्रश्न सोडविणे आवश्यक आहे.  
2) उजवीकडील अंक पूर्ण गुण दर्शवितात.

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प्रश्न 1) खालीलपैकी कोणत्याही एका विषयावर 400 शब्दांत निबंध लिहा. [10]

- अ) समाजमाध्यमांची नैतिक जबाबदारी
- ब) रोकडविरहित (Cashless) व्यवहार: स्वरूप आणि वास्तव
- क) दुष्काळनिवारणासाठी जलयुक्त शिवार योजना

प्रश्न 2) खालीलपैकी एका प्रश्नाचे उत्तर 300 शब्दांपर्यंत लिहा. [15]

‘अतिरेकी’ या विज्ञानकथेतून अरूण मांडे यांनी उपग्रहावरील गुन्हेगारीचे दर्शन कसे घडविले आहे ते सोदाहरण लिहा.

किंवा

डॉ. धनश्री भिडे यांनी सौंदर्यवृद्धीसाठी कोणकोणत्या शस्त्रक्रियांची माहिती दिली आहे, ते सविस्तर लिहा.

प्रश्न 3) टिपा लिहा. (कोणत्याही तीन) [15]

- अ) विज्ञानकथा: स्वरूप व वैशिष्ट्ये
- ब) वैज्ञानिक दृष्टिकोनाची वैशिष्ट्ये
- क) नॅनो तंत्रज्ञानाचे स्वरूप
- ड) ‘पहाड’ कथेतील ‘प्रामाचे’ व्यक्तिचित्र
- इ) भारतरत्न ‘सी.एन.आर राव’ यांचे बालपण
- फ) ‘जनुक’ तंत्रज्ञानाचे फायदे



**[5215] - 132**  
**S. Y. B.Sc. (Semester - I)**  
**हिंदी (HINDI) General**  
**(2013 पॅटर्न)**

पाठ्य-पुस्तकें :- 1) भारती गद्य - संग्रह  
सं. डॉ. मधु धवन  
2) कवितायन  
सं. डॉ. भोलानाथ तिवारी

समय : 2 घंटे]

[पूर्णांक : 40

सूचनाएँ :- 1) सभी प्रश्न अनिवार्य हैं।  
2) दाहिनी ओर लिखे अंक प्रश्न के पूर्णांक हैं।

---

प्रश्न 1) अ) निम्नलिखित में से किन्हीं छह वाक्यों को शुद्ध करके फिर से लिखिए। [6]

- i) उसने अनेकों ग्रंथ लिखे।
- ii) प्रेरणा ने जोर से हँस दिया
- iii) मैं रविवार के दिन तुम्हारे घर आऊँगा।
- iv) सिंह बड़ा बीभत्स होता है।
- v) क्या यह संभव हो सकता है?
- vi) वह लगभग दौड़ रहा था।
- vii) विभिन्न प्रकार की तुरटियाँ हैं।
- viii) हिंदी के प्रचार में आज भी बड़े बड़े संकट हैं।

आ) निम्नलिखित अंग्रेजी अनुच्छेद का हिंदी में अनुवाद कीजिए। [6]

"Strongly protesting against the decision to implement a ban on six-seater autorikshaws, the Jay Bhavani six seater Rikshaw Sena will hold a morcha at the office of the Regional Transport Authority on June 25.

Nearly a thousand six - seater operators today observed a bandh for nearly three hours in the morning as they participated in a meeting held at pimpri."

- प्रश्न 2) अ) निम्नलिखित गद्य अवतरण की ससंदर्भ व्याख्या कीजिए। [4]
- क) “एक दिन उसने पहाड़ी से पूछा” तुम्हें तो शहर का कोना-कोना दिखाई देता है, बता सकती हो, उस युवक का क्या हाल है?

अथवा

“आपके कर्म और विचार एक - से हैं। अपने अनेक प्यासी आत्माओं की प्यास बुझाई है, जिसका मुकाबला सिंचाई की कोई योजना कभी नहीं कर सकती।”

- आ) निम्नलिखित पद्य अवतरण की ससंदर्भ व्याख्या कीजिए। [4]

ख) “जग पीड़ित है अति दुख से  
जग पीड़ित है अति सुख से।  
मानव जग में बँट जाये  
दुख सुख से औ’ सुख दुख से॥

अथवा

“दूर क्षितिज के सपने में मत भूल,  
देख जरा महासत्य को,  
जिसकी आग प्रचंड, दाह दारुण, प्रत्यक्ष निकट है।”

- प्रश्न 3) अ) निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर लिखिए। [10]

- i) सभ्यता और संस्कृति में कौन - सा मौलिक भेद है?
- ii) बैलून-एंजियोप्लास्टी तकनीक क्या है?
- iii) शोर के मापदंड को स्पष्ट कीजिए।

- आ) निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर लिखिए। [10]

- i) ‘सखि, वे मुझसे कहकर जाते’ कविता की संवेदना को स्पष्ट कीजिए।
- ii) ‘तोड़ती पत्थर’ कविता के आशय को समझाइए।
- iii) ‘इतिहास का न्याय’ कविता के महत्व को लिखिए।



Total No. of Questions : 4]

SEAT No. :

P416

[Total No. of Pages : 2

**[5215] - 133**  
**S. Y. B.Sc. (Semester - I)**  
**SANSKRIT**  
**Geervānbhartee**  
**(गीर्वाणभारती)**  
**(2013 Pattern)**

*Time : 2 Hours]*

*[Max. Marks : 40*

**Q1)** Write short answers of the following questions (2-4lines)

**[16]**

पुढील प्रश्नांची 2-4 ओळीत उत्तरे लिहा.

- a) What did kumara of saryata do with chyavana & Why?  
शर्याताच्या कुमारांनी च्यवनाला काय केले व का?
- b) What is the another name of upanishad and state any two upanishadas?  
उपनिषदाचे दुसरे नाव काय? कोणत्याही दोन प्राचीन उपनिषदांची नावे लिहा.
- c) What did kanvamuni say to trees screepers?  
कण्वमुनी वृक्षवेलींना उद्देशून काय म्हणतात?
- d) What is the meaning of छायाग्राहिसत्त्व?  
'छायाग्राहीसत्त्व' याचा अर्थ काय?
- e) What is the name of satyakamas guru?  
सत्यकामाच्या गुरूचे नाव काय होते?
- f) Who is the adviser of 'अनन्तवान्' पाद?  
'अनन्तवान्' पादाचा उपदेशकर्ता कोण?
- g) Who is the author of 'शिवमानसपूजा' ?  
शिवमानसपूजेचा रचयिता कोण?
- h) What did poet pray to शिव for his guilt?  
कवीने आपल्या अपराधाबद्दल शिवाला कोणती प्रार्थना केली आहे?

**P.T.O.**

**Q2)** Write short note on any two of the following in 8-10 lines.

**[8]**

पुढीलपैकी कोणत्याही दोहोंवर 8-10 ओळीत संक्षिप्त टीपा लिहा.

- a) Sukanyā सुकन्या
- b) Kanva कण्व
- c) Sakuntalā शकुन्तला

**Q3)** Write short note on any two of the following in 8-10 lines.

**[8]**

पुढीलपैकी कोणत्याही दोहोंवर 8-10 ओळीत संक्षिप्त टीपा लिहा.

- a) Rāmāyana रामायण
- b) Explain स्पष्ट करा – न वहेद् गर्व बुधो मनसा।
- c) Explain स्पष्ट करा – न महान्तं क्वापि गर्हेत।

**Q4)** Answer any one of the following in 16-20 lines.

**[8]**

पुढीलपैकी कोणत्याही एका प्रश्नाचे 16-20 ओळीत उत्तर लिहा.

Critically appreciatie ‘सत्यकाम – जाबाल कथा’.

‘सत्यकाम – जाबाल’ कथेचे रसग्रहण करा.

OR/किंवा

Critically appreciatie ‘उपदेशप्रबन्धः’

‘उपदेशप्रबन्धः’ या पाठाचे रसग्रहण करा.



Total No. of Questions : 4]

SEAT No. :

P417

[Total No. of Pages : 2

**[5215] - 134**  
**S.Y. B.Sc. (Semester - I)**  
**ARABIC - FUNCTIONAL**  
**(2013 Pattern)**

*Time :2 Hours]*

*[Max. Marks :40*

**Q1)** Define with examples any two of the following Grammar:

**[10]**

- (١) حُرُوفُ الْجَارِ
- (٢) الضَّمَايِرُ
- (٣) أَسْمَاءُ الْإِشَارَةِ
- (٤) الْعَرَبِيبُ

**Q2)** Translate into English any Five of the following Sentences:

**[10]**

- (١) التَّلَامِيذُ ذَاهِبُونَ إِلَى الْمَدْرَسَةِ -
- (٢) هَذِهِ الْخَافِلَةُ قَادِمَةٌ مِنَ الْكَلْبَةِ -
- (٣) عَلَيَّ رَاجِعٌ مَعَ فَالْمِةِ مِنَ الشُّوقِ -
- (٤) هُوَ ذَاهِبٌ إِلَى بَيْتِ صَدِيقِهِ -
- (٥) هِيَ مَشْغُوكَةٌ فِي مَكْتَبِهَا -
- (٦) رَأْسِيُّ الْقِسْمِ جَالِسٌ فِي بَيْتِهِ -
- (٧) تَلْفِزِيُونٌ فَرِيدَةٌ فِي غُرْفَتِهَا -
- (٨) حَدِيقَةُ الْجَامِعَةِ كَبِيرَةٌ وَجَمِيلَةٌ -

**P.T.O.**

**Q3)** Translate into Arabic any Five of the following Sentences:

**[10]**

- 1) There is a newspaper on the table.
- 2) On the window there is a curtain.
- 3) The chair is comfortable.
- 4) That bus is going to the university.
- 5) In the fridge there is an apple.
- 6) His office is far from his home.
- 7) She is coming from the school.
- 8) My father is working in his room.

**Q4)** Write the terminology in Arabic any ten of the following:

**[10]**

- |             |              |
|-------------|--------------|
| 1) Computer | 2) Radiation |
| 3) Mercury  | 4) Axis      |
| 5) Voltage  | 6) Astrology |
| 7) Heat     | 8) Orbit     |
| 9) Botany   | 10) Solid    |
| 11) Degree  | 12) Liquid   |
| 13) Motion  | 14) Coolness |
| 15) Physics | 16) Matter   |



[5215] - 135

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

URDU (General Paper - II)

(2013 Pattern)

Time : 2 Hours]

[Max. Marks : 40

نوٹ :- ۱) تمام سوالات کے جوابات لازمی ہیں  
۲) سوال کے بائیں جانب نمبر درج ہیں  
سوال نمبر ۱ - ڈاکٹر علامہ اقبال کی شخصیت اور شاعری پر خیالات کا اظہار کیجئے۔ [۱۵]

علامہ اقبال کی نظم نگاری کا جائزہ لیجئے  
سوال نمبر ۲ - اردو نظم نگاری کے آغاز و ارتقاء کا سرسری جائزہ لیجئے [۱۵]

یاں گ درآ کی مستفیظ نظریں پر نقد و تبصرہ کیجئے  
سوال نمبر ۳ - ذیل میں سے کسی ایک نظم کا مرکزی خیال واضح کیجئے [۱۵]

سوال نمبر ۴ - ذیل کے اشعار میں سے کسی پانچ کی تشریح مجملہ سین وکے [۱۵]

- ۱) خاک میں مل کے حیاتِ ابدی پا جاؤں - عشق کا سوز زمانے کو دکھاتا جاؤں
- ۲) جو بیاں تیری شریعت سے ہیں سرگرم سننی - توڑ میں پرادر ملک تیرا وطن
- ۳) آزادیاں کہاں تھیں اپنے گھونٹے کی - اپنی خوشی سے آنا، اپنی خوشی سے جانا
- ۴) غیریت کے پردے اک بار بھول جائیں - بچھڑوں کو بھولادیں، نقشِ دوئی مٹادیں
- ۵) تو طلبِ فوج ہے، تو میرا بھی یہی دستور ہے - جان دینی ہے تو تیرا، عشق میرا نور ہے
- ۶) اے ہمالہ! اے فضلِ کشورِ ہندوستان - چومتا ہے تیری پیشانی کو جھک کر سہماں
- ۷) اٹھو، ایک میری بھی جہاں رہتا ہوں میں - بزم میں اپنی اگر بیکتا ہے تو تمنا ہوں میں



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P419**

**[5215] - 136**

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

**INDUSTRIAL CHEMISTRY**

**Voc : 211 : Utilities, Unit Operations and Process Instrumentation  
(2013 Pattern) (Paper - I) (Semester - I)**

*Time : 2 Hours]*

*[Max. Marks :40*

*Instructions to the candidates:*

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

**Q1)** Answer the following :

**[16]**

- a) Define permanent hardness of water.
- b) Convert 140°F to °C.
- c) Convert 15 psi into torr.
- d) What is extractive distillation?
- e) Write two uses of an inclined manometer.
- f) Convert 500 kg/m<sup>3</sup> into CGS units.
- g) State the principle involved in alphanatron pressure gauge.
- h) What is secondary nucleation?

**P.T.O.**

**Q2)** Answer any two of the following : **[8]**

- a) Describe the role of thermocouples in temperature measurements.
- b) What is the importance of evaporation in industrial operation?
- c) Discuss the construction and working of pirani gauge.

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

- a) Venturi tubes.
- b) Spray drier.
- c) Applications of steam in industries.

**Q4)** Describe construction and working of Lancashire boiler. **[8]**

OR

State and explain the principle involved in distillation. Describe the role of fractional distillation in industrial processes. **[8]**



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P420**

**[5215] - 137**

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

**BIOTECHNOLOGY**

**Voc. Biotech. - 211: Cell & Molecular Biology and Microbial Genetics  
(2013 Pattern) (Semester - I) (Paper - I)**

*Time : 2 Hours]*

*[Max. Marks :40*

*Instructions to the candidates:*

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

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

**[10]**

- a) Define: Conjugation.
- b) What are insertional elements?
- c) Give the role of SSB proteins in DNA replication.
- d) What is nucleosome?
- e) Enlist the enzymes involved in photoreactivation repair.
- f) What are CAM proteins?
- g) State the RPM at which nuclei will settle during cell fractionation?
- h) Enlist the structural components of nuclei.
- i) What is endocytosis?
- j) Give the role of ribosome in protein synthesis.

***P.T.O.***

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

**[10]**

- a) Eukaryotic genome organisation.
- b) Cell differentiation.
- c) Griffith experiment.

**Q3)** Answer any two of the following in brief.

**[10]**

- a) What is cell signaling? Explain different types of cell receptors involved in cell signaling.
- b) What is transduction? Explain the experiment which proved transduction.
- c) Explain active transport with suitable example.

**Q4)** What is ECM? Explain the role of different constituents of ECM.

**[10]**

OR

Explain the detail account of replication of prokaryotes.



Total No. of Questions : 4]

SEAT No. :

**P421**

[5215]-138

[Total No. of Pages : 2

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

**PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION**

**Still Photography, Processing & Printing**

**(2013 Pattern) (Paper-III) (Semester-I)**

*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 in short:

**[16]**

- a) What is depth of field? How is it related to the size of the aperture of a camera lens?
- b) Compare the center weighted and the matrix metering pattern of a DSLR camera.
- c) Explain the concept of complementary colours. Mention suitable examples.
- d) Mention two points of comparison between of artificial light and natural light sources.
- e) What is life size magnification? How is it useful in photography?
- f) What is a 'fast' lens? State its advantages.
- g) What is a 'diopter' of a lens?
- h) Mention one use each of fast and slow shutter speed.

**P.T.O.**

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

- a) Explain the concept of circle of confusion and the circle of least confusion. How does the circle of least confusion affect the depth of field and the depth of focus?
- b) Discuss the use of polarizing filter in photography.
- c) Discuss the effect of over and under exposure on a photographic image.

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

- a) Give suitable examples and compare the hard and the soft light sources.
- b) Discuss in details why white balance is a very important control in a digital photography.
- c) A wide angle lens is generally a slow lens. Explain.

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

- a) Discuss the points of comparison between a telephoto lens and a wide angle lens.
- b) Draw a diagram and show the construction of an electronic flash. Explain the function of each component.



Total No. of Questions : 4]

SEAT No. :

**P422**

[5215]-139

[Total No. of Pages : 2

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

**ELECTRONIC EQUIPMENT & MAINTENANCE**

**VOC-EEM-211: Trouble Shooting Electronic Equipment -A**

**(2013 Pattern) (Paper-I) (Semester-I)**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to the candidates:*

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

**Q1)** Answer the following:

- a) What is trouble shooting? [1]
- b) Differentiate between active and passive components used in equipments. [1]
- c) What is dis-assembly? Which tools are required for it? [1]
- d) Give at least two test instruments and their uses in troubleshooting electronic equipment. [1]
- e) What is transistor tester? [2]
- f) State at least four characteristic parameters of op-amp. [2]
- g) What is potentiometer? How to test it? [2]
- h) What is FET? How to test it? [2]

**P.T.O.**

**Q2)** Attempt any two of the following:

- a) Write a note on failures in capacitors. How to test capacitor? [4]
- b) Give the list of fault finding aids used in equipment maintenance. Explain their importance. How to use them? [4]
- c) Write a note on troubleshooting techniques. Explain split half method. [4]

**Q3)** Attempt any two of the following:

- a) Explain the procedure for testing following devices. [4]
  - i) Diode
  - ii) Zener diode
  - iii) BJT
  - iv) Thyristor
- b) Explain the causes of failure in semiconductor devices. How to avoid them? [4]
- c) What is thermistor? How to test it? Give its one application. [4]

- Q4)**
- a) Mention typical faults in resistor, potentiometer, LDRS. Also give the reasons for them. [6]
  - b) List at least 4 faults in an op-amp circuit. How to repair them? [6]

OR

- a) What is inductor? How to measure the value of inductance? Give the testing procedure for inductor. Give its two applications. [6]
- b) Why the equipment failure takes place? Give at least two causes of it. How to avoid them? [6]



Total No. of Questions : 4]

SEAT No. :

**P423**

[5215]-140

[Total No. of Pages : 2

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

**COMPUTER HARDWARE & NETWORK ADMINISTRATION**

**Microprocessor & Interfacing Techniques**

**(2013 Pattern) (New Course) (Paper-I) (Semester-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) A) Attempt the following:**

**[4×1=4]**

- a) What is significance of Data bus?
- b) State different types of ADC.
- c) List different types of ports that are available on PC.
- d) List different types of key switches?

**B) Attempt the following:**

**[4×2=8]**

- a) Draw block diagram of microcomputer.
- b) Define accuracy.
- c) How to put 8086 Microprocessor to Maximum mode?
- d) What is USB? State any two advantages of USB.

**P.T.O.**

**Q2)** Attempt any two of the following:

**[2×4=8]**

- a) Write a short note on PCI Bus architecture.
- b) What is interrupt? Explain software interrupts in brief.
- c) Write a note on software development tools.

**Q3)** Attempt any two of the following:

**[2×4=8]**

- a) What are the main features of core i3 processors?
- b) With a neat diagram explain keyboard interface with microprocessor.
- c) Write a short note on DRAM.

**Q4)** Attempt any two of the following:

**[2×6=12]**

- a) What is a Microprocessor? List Intel Processors available in market. State main features of Pentium processor.
- b) What is DAC? State different types of DAC. Explain working of any one type of DAC.
- c) What is function of DMA? Explain DMA Controller operation with a neat diagram.



Total No. of Questions : 4]

SEAT No. :

**P424**

[5215]-141

[Total No. of Pages : 2

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

**SEED TECHNOLOGY**

**VOC-ST-211: Hybrid Seed Production**

**(2013 Pattern) (Paper-I) (Semester-I) (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) Neat diagrams must be drawn wherever necessary.*

**Q1)** Answer the following:

**[10]**

- a) Define Heterosis.
- b) What do you mean by isolation distance?
- c) What is male sterility?
- d) Define self Incompatibility.
- e) What is emasculation?
- f) Define Apomixes.
- g) What is a variety?
- h) Define planting ratio.
- i) Write the isolation distance required for cotton hybrid seed production.
- j) Define Gametocides.

**P.T.O.**

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

- a) Comment on cohesion and adhesion.
- b) Describe cytoplasmic-Genetic male sterility.
- c) Explain the genetic basis of Imbreeding depression.

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

- a) Roughing and Pollen shedders.
- b) Use at genetic male sterility.
- c) Kinds of self incompatibility.

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

OR

Give detail procedure of hybrid seed production in Groundnut. [10]



Total No. of Questions : 4]

SEAT No. :

**P425**

[5215]-142

[Total No. of Pages : 2

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

**INDUSTRIAL MICROBIOLOGY - I**

**VOC-IND-MIC-211: Bioreactors - Design and Operation**

**(2013 Pattern) (Theory) (Paper-I) (Semester-I)**

*Time : 2 Hours]*

*[Max. Marks : 40*

*Instructions to Candidates:*

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

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

- a) Define the term “Sterilization”.
- b) State two major reasons for using stainless steel for fermenter construction.
- c) Foam is formed when high carbohydrate containing media are used during fermentation. (True/False)
- d) State the equation for determining the overall ‘Del factor’.
- e) State any two disadvantages of continuous sterilization over batch sterilization.
- f) The range of width for the baffle in the fermenter is \_\_\_\_\_ times of vessel diameter.
- g) Name any two methods used for measurement of microbial biomass in fermenter.
- h) Sparger serve dual purpose of aeration and agitation. (True/False)

**P.T.O.**

- i) Name any two chemical substances which are used as antifoam agents in fermentation.
- j) A continuous bioreactor in which only the flow rate is used to control the rate of cell or product productivity is called \_\_\_\_\_ (chemostat/turbidostat/pH stat)

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

- a) Draw labeled diagram of continuous stirred tank reactor.
- b) Explain the design of the different types of impellers.
- c) Explain fed-batch mode with example.

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

- a) Explain the principle of broth sterilization by heat.
- b) Diagrammatically explain tubular bioreactor.
- c) Explain the control of pH during fermentation.

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

- a) Describe the on line, offline and in-line data acquisition and analysis.
- b) Explain the operation of a fermentation using an immobilized cell system. Give details of the need, names of products made using this operation, advantages and disadvantages of the process over fermentations using suspended growth.



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P426**

**[5215] - 143**

**S.Y.B.Sc.**

**INDUSTRIAL CHEMISTRY (Vocational)**

**212 : Inorganic Process Industries**

**(2013 Pattern) (Semester - I) (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) Neat diagrams should be drawn wherever necessary.*

**Q1)** Answer the following:

**[16]**

- a) Write the constituents present in ordinary cement.
- b) What are Refractories?
- c) Describe the role of safety glass.
- d) What is the meaning of galvanic corrosion?
- e) What is Slip casting?
- f) Write the different types of ceramics.
- g) Discuss the role of glazing.
- h) Explain Ferroelectric material.

**P.T.O.**

**Q2)** Answer any two of the following.

**[8]**

- a) Outline the general method involved in ceramic production.
- b) Explain the setting and hardening of cement.
- c) What are fire clay refractories? Write two uses of them.

**Q3)** Write short notes on any two of the following.

**[8]**

- a) Rotary kiln
- b) Annealing of glass.
- c) Applications of enamels.

**Q4)** Describe manufacture of cement by dry process with special reference to chemical reactions taking place in different zones. **[8]**

OR

Describe the manufacture of glass by pot furnace method with special reference to chemical reactions taking place in different zones. **[8]**



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P427**

**[5215] - 144**

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

**BIOTECHNOLOGY**

**Recombinant DNA Technology**

**(2013 Pattern) (Semester - I) (Paper - II)**

*Time : 2 Hours]*

*[Max. Marks :40*

*Instructions to the candidates:*

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

**Q1)** Answer the following:

**[10]**

- a) Define Cloning vectors.
- b) Enlist any two NIH guidelines for rDNA technology.
- c) Give an example of Restriction enzyme with its recognition sequence.
- d) Give any two applications of site-directed mutagenesis.
- e) Mention the types of PCR.
- f) Define proteomics.
- g) What is transfection.
- h) Name the methods for radioactive labelling of nucleic acids.
- i) Give any two important applications of northern blotting.
- j) What is YAC?

**P.T.O.**

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

**[10]**

- a) Western blotting
- b) Genomics.
- c) PCR.

**Q3)** Answer any two of the following:

**[10]**

- a) Describe Maxam and Gilbert's DNA sequencing method.
- b) What are probes? Describe non-radioactive labelling of nucleic acids.
- c) Describe the process of site-directed mutagenesis.

**Q4)** What are phage vectors? Describe in detail any two phage cloning vectors. **[10]**

OR

What is gene cloning? Give the steps of gene cloning. Add a note on applications of gene cloning.



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P428**

**[5215] - 145**

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

**PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION**  
**Fundamentals of Acoustics and Sound for Media (Paper - IV)**  
**(Semester - I)**

*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)** Attempt ALL of the following:

- a) Mention four basic requirements of an auditorium. [2]
- b) What is audio delayer? [2]
- c) Define: Reverberation time. [2]
- d) Explain the necessity of crossover network. [2]
- e) What is a microphone? Mention any two types of special microphones. [2]

**Q2)** Attempt ANY TWO of the following:

- a) Design a crossover network to give 12 dB per octave attenuation for tweeter and woofer for critical frequency of 1 kHz. Loudspeaker resistance is  $8\Omega$ . [5]
- b) State five characteristics of loudspeakers and explain them in brief. [5]
- c) Explain the concept of resistance, inductance and capacitance in acoustical system with the help of suitable examples. [5]

**P.T.O.**

**Q3)** Attempt ANY TWO of the following:

- a) Using a neat and labelled diagram, explain the functioning of bass reflex enclosure with port using suitable circuit. [5]
- b) With the help of a neat sketch, explain the functioning of a crystal microphone. Explain why ceramic crystal is more suitable than Rochelle salt crystal. [5]
- c) Calculate the reverberation time for an auditorium of 1000 cubic meters having total absorption equal to 230 Sabine. [5]

**Q4)** Attempt ANY TWO of the following:

- a) Draw a neat labeled block diagram to explain the construction and working of a magnetic sound recording system. [5]
- b) With the help of a neat sketch, explain the functioning of a horn type loudspeaker. Explain why it is called an indirect radiating type loudspeaker. [5]
- c) Sound intensity at 1 meter from a loudspeaker is  $400 \text{ mW/m}^2$ . The audio power fed to the loudspeaker is 10 W. Calculate the efficiency of the loudspeaker. [5]

*EEE*

Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P429**

**[5215] - 146**

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

**ELECTRONIC EQUIPMENT MAINTENANCE**

**VOC-EEM-212: Audio, Video & Office Equipment - A**

**(2013 Pattern) (Semester - I) (Paper - II)**

*Time : 2 Hours]*

*[Max. Marks :40*

*Instructions to the candidates:*

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

**Q1)** Answer the following:

- a) State the factors on which speed of tape transport depends. [1]
- b) Give the function of CRT. [1]
- c) State two differences between AM and FM. [1]
- d) What is Blue-ray disc? [1]
- e) State the advantages of DVD over CD. [2]
- f) State the need of AC bias in tape recorder. [2]
- g) What is the purpose of Sync pulse in TV system. [2]
- h) State the Principle of interlace scanning. [2]

**Q2)** Answer any two of the following:

- a) Write a short note on Home theater system. [4]
- b) Draw a neat labelled block diagram of Video monitor. [4]
- c) What is digital television? State its advantages over analog TV. [4]

**P.T.O.**

**Q3)** Answer any two of the following:

- a) Write a note on 'vestigial side band'. [4]
- b) Explain with block-diagram the working of tape recorder. [4]
- c) Explain the working of super-heterodyne AM receiver with neat block diagram. [4]

**Q4)** Answer the following:

- a) Explain with neat block diagram the recording and replay mechanism of CD player. [6]
- b) What is CCTV? Draw its block diagram and explain its working. [6]

OR

Answer the following:

- a) Explain the working of PA system with the help of neat block diagram. [6]
- b) Draw the neat block diagram of LCD TV and explain its working. [6]

*EEE*

Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P430**

**[5215] - 147**

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

**COMPUTER HARDWARE & NETWORK ADMINISTRATION**

**Computer System Management (Paper - II)**

**(2013 Pattern) (Semester - 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) a)** Attempt the following: **[4×1=4]**

- i) What is the function of UPS?
- ii) What do you mean by Booting?
- iii) List various components on motherboard.
- iv) List various diagnostic utilities used in computer system.

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

- i) What is noise? List various types of cables used in PC.
- ii) List various startup problems with modern PC.
- iii) State any two memory related problems.
- iv) List various HDD related problems.

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

- a) Write a short note on preventive maintenance of PC.
- b) In what different ways can a printer malfunction? How will you overcome them?
- c) What are causes for incidents and disaster? Explain the importance of recovery Plan?

**P.T.O.**

**Q3)** Attempt any two of the following:

**[2×4=8]**

- a) Explain the precaution that should be taken while handling hard disk drive and CDROM.
- b) Write a short note on repair generated failure.
- c) Explain effect of heat and cold as contributor to system failure.

**Q4)** Attempt any two of the following:

**[2×6=12]**

- a) State various display adaptors and their functions. Explain in brief various problems related to them.
- b) List various electronic equipments used in troubleshooting. State and explain general rules for troubleshooting of computer.
- c) List common problems in modern PC. Explain in brief problems that may arise while using keyboard and mouse.

*EEE*

Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P431**

**[5215] - 148**

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

**SEED TECHNOLOGY - II**

**VOC-ST-212: Seed Testing**

**(2013 Pattern) (New) (Semester - I) (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) Neat diagrams must be drawn wherever necessary.*

**Q1)** Answer the following:

**[10]**

- a) Define Germination.
- b) Enlist kinds of seed sampling.
- c) What is ISTA?
- d) Give any one principle of seed vigour testing.
- e) Define inert matter component of Physical Purity Analysis.
- f) What is reporting of results?
- g) Define seed testing.
- h) Enlist methods of moisture testing.
- i) Give the importance of central seed testing laboratory.
- j) Define certification sample.

**P.T.O.**

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

- a) Describe staffing in relation to seed testing laboratory.
- b) Give the role of ISTA.
- c) Explain in detail types of seed samples.

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

- a) General procedure for seed vigour testing.
- b) ODV test.
- c) Physical Purity Analysis.

**Q4)** Explain in detail methods used for testing seed germination. [10]

OR

Describe in detail mixing and dividing sample. [10]

*EEE*

Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

**P432**

**[5215] - 149**

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

**INDUSTRIAL MICROBIOLOGY**

**VOC-IND-MIC-212: Screening and Process Optimization (Paper - II)**  
**(2013 Pattern) (Theory) (Semester - I)**

*Time : 2 Hours]*

*[Max. Marks :40*

*Instructions to the candidates:*

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) 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:

**[10]**

- a) Define 'Strain improvement'.
- b) What is the role of dummy variables in Plackett-burman Design?
- c) Enlist any two antifoam agents used in fermentation industry.
- d) What is cryopreservation?
- e) Define 'Revertant'.
- f) Enlist any two carbon sources used in fermentation industry.
- g) What is Metagenomics?
- h) Define 'Precursor'.
- i) What are the isozymes?
- j) Enlist any two inducers used in fermentation process.

**P.T.O.**

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

- a) Discuss the process of scale up.
- b) With the help of suitable example justify 'Modification in cell permeability increases the overall productivity'.
- c) Give criteria for the preparation of fermentation growth medium.

**Q3)** Write a short note on any two of the following: [10]

- a) Secondary screening.
- b) Inoculum build-up.
- c) Response surface methodology.

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

- a) Discuss various models of feedback regulation with the help of suitable examples.
- b) Explain various scales of fermentation process with the help of a suitable example.

*EEE*