

Total No. of Questions : 4]

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[4017] - 28

F.Y. B.Sc.

FOUNDATION COURSE (Restructuring)

(46000) (2008 Pattern)

Time : 3 Hours]

[Max Marks : 80

Instructions :

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

Q1) Explain the following concepts in 50 words each. (any two) **[10]**

- a) Poverty.
- b) Hypothesis.
- c) Superstitions.
- d) Rule of Law.

Q2) Write the following short notes in 100 words each. (any four) **[20]**

- a) Population Explosion
- b) Basic Human Value
- c) Unemployment
- d) Society
- e) Reservation
- f) Global Warming

Q3) Write answer of the following questions in 200 to 250 words each. (any three) **[30]**

- a) Explain the characteristics of Indian Culture.
- b) Write the characteristics of Science.
- c) Explain the Demerits of cast system in India.
- d) State the effects of Science and Technology on Industries and Employment.
- e) Explain the Problems of Energy and Water Resources.

P.T.O.

Q4) Write the answer of any one of the following questions in 500 words. [20]

- a) What is National Integration? Suggest the measures to remove the obstacles in the way of National Integration.
- b) Explain the causes and effects of Pollution.

Total No. of Questions : 4]
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[Total No. of Pages : 2

[4017] - 28

प्रथम वर्ष विज्ञान (F.Y. B.Sc.)

पायाभुत अभ्यासक्रम (नवीन अभ्यासक्रम)

(2008 पॅटर्न)

(मराठी रूपांतर)

वेळ : 3 तास]

[एकूण गुण : 80

- सूचना: -
- 1) सर्व प्रश्न सोडविणे आवश्यक आहेत.
 - 2) उजवीकडील अंक पूर्ण गुण दर्शवितात.
 - 3) संदर्भासाठी मुळ इंग्रजी प्रश्नपत्रिका पहावी.

प्रश्न 1) पुढील संकल्पना 50 शब्दांत स्पष्ट करा. (फक्त दोन) [10]

- अ) दारिद्र्य
- ब) गृहितक
- क) अंधश्रद्धा
- ड) कायदयाचे अधिराज्य

प्रश्न 2) पुढील टिपा प्रत्येकी 100 शब्दात लिहा. (फक्त चार) [20]

- अ) लोकसंख्या विस्फोट
- ब) मूलभूत मानवी मूल्य
- क) बेरोजगारी
- ड) समाज
- इ) आरक्षण
- फ) जागतिक तापमान वाढ

P.T.O.

- प्रश्न 3) पुढील प्रश्नांची उत्तरे 200 ते 250 शब्दांत लिहा. (फक्त तीन) [30]
- अ) भारतीय संस्कृतीची वैशिष्ट्ये स्पष्ट करा.
- ब) विज्ञानाची वैशिष्ट्ये लिहा.
- क) भारतातील जातीप्रथेचे दोष स्पष्ट करा.
- ड) उद्योग व रोजगार यावरील विज्ञान तंत्रज्ञानाचे परिणाम सांगा.
- इ) उर्जा व पाण्याचे स्रोत या बाबतच्या समस्या स्पष्ट करा.

- प्रश्न 4) पुढीलपैकी एका प्रश्नांचे उत्तर 500 शब्दात लिहा. [20]
- अ) राष्ट्रीय एकात्मता म्हणजे काय ? भारतातील राष्ट्रीय एकात्मतेच्या मार्गातील अडथळे दूर करण्यासाठी उपाय सुचवा.
- ब) प्रदुषणाची कारणे व परिणाम स्पष्ट करा.

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P202**[4017]-1****F.Y. B.Sc.****MATHEMATICS****Algebra and Geometry****(Paper - I) (2008 Pattern) (41110)***Time : 3 Hours]**[Max. Marks : 80**Instructions to the candidates:*

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

Q1) Attempt all subquestions :**[16]**

- a) Define - partition of a set. Is $\{\{a,c,e\},\{b,d\},\{f\}\}$ a partition of the set $\{a,b,c,d,e,f\}$? Justify.
- b) Find the values of x which satisfy the equation $x^2 = x$, in Z_4 .
- c) Find the real and imaginary parts of $\frac{2-3i}{4+7i}$.
- d) Find the quotient and remainder when $3x^4 + 6x^3 + 8x^2 - 2x - 3$ is divided by $2x^3 + x^2 - 9$.
- e) Find the centre of the conic $5x^2 + 6xy + 5y^2 - 22x - 6y + 21 = 0$.
- f) Show that the points A(5, 4, -6), B(3, 2, -4) and C(9, 8, -10) are collinear.
- g) Find the equation of a tangent plane to the sphere $x^2 + y^2 + z^2 + 4x - 2y + 2z - 12 = 0$ at (2, 2, 0).
- h) Define rank of a matrix. What is the rank of the matrix $\begin{bmatrix} x & x \\ x & x \end{bmatrix}$, where $x \neq 0$.

P.T.O.

Q2) Attempt any four of the following :

[16]

- a) Let $f : (-1,1) \rightarrow \mathbf{R}$ be a function defined by $f(x) = \frac{x}{\sqrt{1+x^2}}$. Show that f is bijective. Also find f^{-1} .
- b) Show that congruence relation on \mathbf{Z} is an equivalence relation.
- c) Find the remainder of 5^{38} , when divided by 11.
- d) Find the real and imaginary parts of $z = \left(\frac{1+2i}{3-4i} \right)^2$.
- e) Solve the equation $x^3 - 5x^2 - 16x + 80 = 0$. The sum of two of its roots being equal to zero.
- f) Sketch the set of points determined by $|z - 1 + i| = 1$. What does it represent?

Q3) Attempt any two of the following :

[16]

- a) State and prove De Moivre's theorem.
- b) State and prove Fermat's Theorem.
- c) i) Let R be a relation in \mathbf{Z} such that $R = \{(a,b) \in \mathbf{Z} \times \mathbf{Z} / 2 \text{ divides } a - b\}$. Show that R is an equivalence relation. What is $[0]$?
- ii) If a, b, c are the roots of the equation $x^3 + qx + r = 0$, find the value of $(b-c)^2 + (c-a)^2 + (a-b)^2$.
- d) i) Show that 64 and 43 are relatively prime, find x, y such that $64x + 43y = 1$.
- ii) In \mathbf{Z}_{10} , find the values of $(\bar{3})^3, (\bar{100})^5, (\bar{7})^7$.

Q4) Attempt any four of the following :

[16]

- a) Derive the rotation formulae in the form
 $x = x' \cos \theta - y' \sin \theta, y = x' \sin \theta + y' \cos \theta$.
- b) Derive the intercept form of the equation of plane.
- c) Find the centre and radius of the circle,
 $x^2 + y^2 + z^2 + 2x - 2y - 4z - 19 = 0, x + 2y + 2z + 7 = 0$.
- d) Find the equation of the plane passing through the points $A(1, 1, 1), B(1, -1, 1), C(-7, -3, -5)$.

- e) Show that the plane $2x - 2y + z + 16 = 0$ touches the sphere $x^2 + y^2 + z^2 + 2x - 4y + 2z - 3 = 0$. Find the point of contact.

- f) Reduce the following matrix $\begin{bmatrix} -1 & 2 & 3 & 0 \\ -1 & 1 & 1 & 4 \\ 3 & 6 & 9 & 0 \end{bmatrix}$ to echelon form. Hence

find its rank.

Q5) Attempt any two of the following : **[16]**

- a) Reduce the equation $x^2 - 4xy - 2y^2 + 10x + 4y = 0$ to its standard form and name the conic.
- b) Prove that the sum of the squares of the direction cosines of a line is one.
- c) i) Find the equation of a plane which passes through the line of intersection of the plane $2x + y - z = 3$ and $5x - 3y + 4z + 9 = 0$ and is parallel to the line whose direction ratios are 2, 4, 5.
- ii) Obtain the equation of the circle lying on the sphere $x^2 + y^2 + z^2 - 2x + 2y - 4z + 3 = 0$ and having its centre (2, 2, -3).
- d) Show that the system of homogeneous equations -

$$2x_1 - 3x_2 + 4x_3 - x_4 = 0,$$

$$7x_1 + x_2 - 8x_3 + 9x_4 = 0,$$

$$2x_1 + 8x_2 + x_3 - x_4 = 0,$$

has infinite solutions. Find any one of them.



P203**[4017]-2****F.Y. B.Sc.****MATHEMATICS (Calculus)
(Paper - II) (2008 Pattern) (41120)***Time : 3 Hours]**[Max. Marks : 80**Instructions to the candidates:*

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

Q1) Attempt each of the following :**[16]**

- a) Determine the set $A = \{x \in \mathbb{R} \mid |x - 1| < 0.5\}$.
- b) Show that the series $\sum_{n=1}^{\infty} \frac{n}{n+1}$ is divergent.
- c) Show that $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n+1}\right)^n = e$.
- d) If $f(x) = 1+2x$ if $x < 1$
 $= 5 - 2x$ if $x > 1$
then find $\lim_{x \rightarrow 1} f(x)$ if exist.
- e) Discuss the continuity of the function $f(x)$ at $x = 0$ where

$$f(x) = \frac{|x|}{x}; x \neq 0.$$

$$= 0; \quad x = 0$$

- f) Evaluate $\lim_{x \rightarrow 0} x \log x$.
- g) State Rolle's theorem.
- h) Find fifth derivative of $\sin 2x$.

Q2) Attempt any four of the following :**[16]**

- a) Prove that $|x + y| \leq |x| + |y|$, for all $x, y \in \mathbb{R}$.
- b) Show that every convergent sequence of real numbers is cauchy sequence.
- c) Show that the sequence $\{x_n\}$ where

$$x_n = \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{n+n}$$

is convergent.

P.T.O.

- d) Show that the sequence $\{x_n\}$ defined by $x_1 = \sqrt{3}$ and $x_{n+1} = \sqrt{3x_n}$ for an $n \in \mathbb{N}$ is convergent. Also find its limit.
- e) Evaluate $\lim_{x \rightarrow 0} \frac{e^{\frac{1}{x}} - 1}{\frac{1}{e^x} + 1}$ if it exist.
- f) Discuss the convergence of the series $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$.

Q3) Attempt any two of the following : **[16]**

- a) Prove that $\sum_{n=1}^{\infty} \frac{1}{n^p}$ is convergent if $p > 1$. Hence find p for which the series $\sum_{n=1}^{\infty} \frac{\sqrt{n+1} - \sqrt{n}}{n^p}$ is convergent.
- b) Let $x_1 = \sqrt{2}$ and $x_{n+1} = \sqrt{2 + x_n}$ for all $n \in \mathbb{N}$ prove that
- i) $\{x_n\}$ is increasing.
 - ii) $\{x_n\}$ is convergent.
 - iii) $\lim_{n \rightarrow \infty} x_n = 2$
- c) i) If limit of a function $f\{x\}$ as $x \rightarrow c$ exist then prove that it is unique.
 ii) Find all real numbers 'x' that satisfy the inequality $|x^2 - 1| \leq 3$.
- d) i) State the field axioms for set of real numbers.
 ii) Prove that $\lim_{x \rightarrow 0} x \sin \frac{1}{x} = 0$

Q4) Attempt any four of the following : **[16]**

- a) State and prove Lagrange's mean value theorem.
- b) Verify Rolle's theorem for the function $f(x) = \log \left[\frac{x^2 + ab}{(a+b)^x} \right]$ on $[a, b]$.
- c) Verify Cauchy's mean value theorem for the functions $f(x) = \frac{1}{x^2}$ and $g(x) = \frac{1}{x}$ in $[a, b]$; $a > 0$.

d) Discuss the continuity of the function $f(x)$ on $[0, 1]$ where

$$f(x) = x \quad \text{if } 0 \leq x < \frac{1}{2}$$

$$= 1 \quad \text{if } x = \frac{1}{2}$$

$$= 1 - x \quad \text{if } \frac{1}{2} < x \leq 1$$

e) Evaluate $\lim_{x \rightarrow 0} \left(\frac{1}{x} - \cot x \right)$.

f) Expand $2 + x^2 - 3x^5 + 7x^6$ in powers of $(x - 1)$.

Q5) Attempt any two of the following :

[16]

a) State and prove Leibnitz's theorem. Hence find y_4 if $y = x^4 e^x$.

b) i) Let $f : [a, b] \rightarrow \mathbf{R}$ be a continuous function on $[a, b]$ then prove that f attains every value between a and b .

ii) Discuss the continuity of the function $f(x)$ where $f(x) = \sqrt{(x-2)(7-x)}$.

c) i) If $y = \frac{1}{x^2 - 4x + 3}$ then find y_n .

ii) Evaluate $\lim_{x \rightarrow 0} x^{\sin x}$.

d) i) If $y = \frac{\sin^{-1} x}{\sqrt{1-x^2}}$ then prove that

$$(1-x^2)y_{n+2} - (2n+3)xy_{n+1} - (n+1)^2 y_n = 0.$$

ii) Prove that $\frac{x}{1+x^2} < \tan^{-1} x < x$ for all $x > 0$.



P204

[4017]-3

F.Y. B.Sc.

PHYSICS - I

Mechanics and Heat and Thermodynamics

(2008 Pattern) (Paper - I) (41210)

Time : 3 Hours]

[Max. Marks : 80

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

Q1) Attempt all of the following :

- a) Define average speed. Give its SI unit. [2]
- b) A body of mass 25 kg is acted upon by a force of 5N. Find acceleration of the body. [2]
- c) Define non-conservative force. Give its example. [2]
- d) What is surface tension? Give its SI unit. [2]
- e) What is equation of state? Give equation of state for perfect gas. [2]
- f) What is mean by irreversible process? Give example. [2]
- g) State the principle of air conditioning. [2]
- h) Find the temperature on Fahrenheit scale corresponding to 30° C. [2]

Q2) Attempt any four of the following :

- a) What is instantaneous velocity? Interpret the instantaneous velocity using $x - t$ graph. [4]
- b) What is gravitational force? Give its properties. [4]
- c) State and prove work - energy theorem. [4]
- d) Calculate the speed of the bob of a simple pendulum at its mean position, if the bob be able to rise a maximum vertical height of 5 cm. [4]
- e) A film of soap solution is formed in a metal ring of radius 1.5cm. Find the potential energy stored in the film if the surface tension of soap solution is 0.035 J/m². [4]
- f) Water flowing in a horizontal pipe has a speed 20 cm/s at one end point and 15 cm/s at another point. Determine the pressure drop between two points. (Given : density of water $\delta = 1 \text{ gm/cm}^3$. [4]

P.T.O.

Q3) Attempt any four of the following :

- a) Derive an expression for workdone during an adiabatic process. [4]
- b) State and explain second law of thermodynamics. [4]
- c) Explain otto cycle with an indicator diagram. [4]
- d) Van - der waal's constants are $a = 0.364 \text{ Nm}^4 \text{ mole}^{-2}$ $b = 4.28 \times 10^{-5} \text{ m}^3 \text{ mole}^{-1}$
calculate the critical volume and critical temperature of the gas. [4]
- e) The resistance of the windings in a certain motor is found to be go ohm at R. T. (30°C). When operating at full load under steady conditions, the motor is switched off and resistance of windings is found to be 100 ohm. The windings is made of copper whose resistance at temperature $t^\circ \text{ C}$ is given by
$$R_t = R_o(1+0.004t)$$
where R_o is resistance at 0° C find temperature attained by coil during full load. [4]
- f) A reversible refrigerator works between 0° C and 30° C . Calculate the coefficient of performance. [4]

Q4) Attempt any two of the following :

- a) Discuss in detail the working of venturimeter. [8]
- b) i) A motor cycle starts from rest and maintains a constant acceleration of 4 m/s^2 for 6 seconds. Find the acquired velocity and total distance travelled. [4]
ii) State and explain principle of conservation of energy. [4]
- c) i) Explain various factors affecting on surface tension of liquid. [4]
ii) Two blocks of mass $m_1 = 10\text{kg}$ and $m_2 = 20\text{kg}$ are tied together by light string and are placed on frictionless horizontal surface when m_1 is pulled by a force F an acceleration 10 m/s^2 is produced in both masses. Calculate [4]
 - 1) The magnitude of the force.
 - 2) Tension in the string.

Q5) Attempt any two of the following :

- a) What is the principle of refrigeration? Give the schematic representation of refrigerator. [8]
- b) i) Calculate the workdone during an isothermal expansion of 4 moles of an ideal gas from a volume of 4 litres to 16 litres at 0° C . [4]
ii) Explain construction and working of gas filled thermometer. [4]
- c) i) Explain for thermodynamic functions U , H , F and G . [4]
ii) A reversible heat engine working between 273° K and 373° K absorbs 700 J of heat from the source. [4]
Calculate
 - 1) Workdone.
 - 2) Efficiency.



Total No. of Questions : 5]

[Total No. of Pages : 2

P208

[4017]-7
F.Y. B.Sc.
BOTANY - I
Plant Diversity
(2008 Pattern) (41410) (Paper - I)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following : **[16]**

- a) What are phanerogams?
- b) Define fungi.
- c) What are lichens?
- d) Give any two general characters of bryophytes.
- e) Give any two points of importance of tissue culture in conservation of plant diversity.
- f) What is cruciform corolla?
- g) Mention parts of stamen.
- h) What are gymnosperms?

Q2) Attempt any four of the following : **[16]**

- a) What are cryptogam's?
- b) Describe archeonium in bryophytes.
- c) Describe thallus of Ulothrix.
- d) Explain etaerio of berries with example.
- e) Give schematic representation of life cycle in pteridophytes - with suitable example.
- f) Give the need of conservation of plant diversity.

P.T.O.

Q3) Write short notes on any four of the following : **[16]**

- a) Structure of mycelium in cystopus.
- b) Foliose Lichen
- c) Thallus of Ulva
- d) Biparous type of cymose inflorescence.
- e) National parks.
- f) Siphonostele.

Q4) Attempt any two of the following : **[16]**

- a) Describe thallus diversity in algae with example.
- b) Describe any four methods of vegetative reproduction in bryophytes.
- c) Give affinities of gymnosperms with pteridophytes and angiosperms.
- d) What is placentation? Describe any two types of placentation studied by you.

Q5) Describe in detail the life cycle pattern in Agaricus. **[16]**

OR

Sketch, label and describe internal structure of dicot stem and monocot stem.



Total No. of Questions : 5]

[Total No. of Pages : 2

P209

[4017]-8

F.Y. B.Sc.

BOTANY

Plant Resources - Management and Utilization

(Paper - II) (41420) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following :

[16]

- a) Give two uses of rubber.
- b) Mention any two criteria for seed selection.
- c) What are invasive weeds?
- d) Give two examples of ornamental plants grown in the green house.
- e) Name two methods used for vase life improvement.
- f) What is Trichogramma?
- g) Mention names of plants used in phytoremediation.
- h) What is bioprospecting?

Q2) Answer any four of the following :

[16]

- a) Give brief account of two sources of fiber and tannins.
- b) Describe any four types of nurseries.
- c) Describe chemical method of weed control.
- d) Write about plant material used in flower arrangement.
- e) Give applications of phytoremediation.
- f) Write about two sources of timber.

P.T.O.

Q3) Write short notes on any four of the following : **[16]**

- a) Sustainable uses of weeds.
- b) Sprinkler irrigation.
- c) Air layering.
- d) Social flower arrangement.
- e) Phytovolatilization
- f) Gum

Q4) Answer any two of the following : **[16]**

- a) Describe structure and covering material used in green house technology.
- b) Enlist natural vegetative plant parts used for plant propagation and describe any two of them.
- c) Describe source, preparation and uses of Azadirachtin.
- d) Write about biochemical resources obtained from fungi.

Q5) Describe techniques used for harvesting of fruits, flowers and medicinal plants. **[16]**

OR

Describe part used, products and uses of rose, amla and ginger.



P225

[4017]-26

F.Y. B.Sc.

ENVIRONMENTAL SCIENCE - I

ENV 101 : Life Sciences : Basic Biology & Natural Resources

(42410) (2008 Pattern) (Paper - I)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following :

[16]

- a) What is connecting link?
- b) What is Bionomial system?
- c) Write a causative agent of malaria.
- d) What are amphibious plants?
- e) Define 'Endangezed Species concept'.
- f) What is mixed cropping.
- g) Give any two examples of renewable energy resources.
- h) What are precious metals.

Q2) Answer any four of the following :

[16]

- a) What are fossils. How fossils are formed in nature.
- b) 'Biology is hope of World' discuss.
- c) How do algae differ from fungi?
- d) Classify resources according to their utility to human life.
- e) Explain 'Forest is National Resource'.
- f) 'Drought is natural hazard' Discuss.

P.T.O.

Q3) Write a short note on any four of following : **[16]**

- a) Classification of plant kingdom.
- b) Storing of Herbarium.
- c) Xerophytic adaptation.
- d) Wild life of India.
- e) Types of coal on the basis of carbon content.
- f) Effects of modern agriculture practices.

Q4) Attempt any two of the following : **[16]**

- a) How do Fungi differ from most of the other plants.
- b) What are Halophytes. How they are resemble with xerophytes & Hydrophytes.
- c) Discuss different types of freshwater resources of India.
- d) “Flood is man - made disasture” Discuss.

Q5) With illustrated diagram, describe zonation of marine environment. Add a note on various physico - chemical aspects of marine environment. **[16]**

OR

Examine importance of coal in economic development of the country.



P226

[4017]-27

F.Y. B.Sc.

ENVIRONMENTAL SCIENCE - II

**ENV - 102 : Earth Sciences :- Environmental Chemistry & Basic
Geosciences**

(Paper - II) (42420) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following :

[16]

- a) What is Global Warming?
- b) Define pesticide.
- c) What are acid halides?
- d) Define solubility product.
- e) What are sedimentary rocks? Give any two suitable examples.
- f) Define condensation.
- g) What is Inversion of temperature?
- h) Define Lithosphere.

Q2) Answer any four of the following :

[16]

- a) Explain the chemical properties of water.
- b) Explain in brief detergents with suitable examples.
- c) Give the effects of mercury on human body.
- d) Describe the process of soil formation.
- e) What is atmospheric pressure? Add a note on wind.
- f) Discuss chemical composition of atmosphere.

P.T.O.

Q3) Write short notes on any four of the following : **[16]**

- a) Effects of carcinogenic compound.
- b) Classification of pesticides.
- c) Stoichiometry.
- d) Rock cycle.
- e) Plate Tectonic.
- f) Types of Lapse rate.

Q4) Attempt any two of the following : **[16]**

- a) What are hydrocarbons? Discuss its effects on macro and microorganisms.
- b) Define atmosphere. Describe chemical reactions involved in global warming.
- c) Explain in detail hydrological cycle.
- d) Describe evolution of atmosphere. Add a note on stratification of atmosphere.

Q5) Describe physical and chemical properties of lead. Add a note on toxic effects of lead on Human body. **[16]**

OR

Describe in detail process of weathering and soil formation.



P228

[4017]-29

F.Y. B.Sc. (Vocational)

INDUSTRIAL CHEMISTRY - I

(Paper - I) (Theory) (2008 Pattern) (45610)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *Answer to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *All questions carry equal marks.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*
- 7) *All questions are compulsory.*

SECTION - I

Q1) Answer the following : **[8]**

- a) Define and explain Lyophillicsols.
- b) What is the effect of temperature on adsorption of gases on solids?
- c) What is negative catalysis.
- d) Define promoters.

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

- a) Describe any two characteristics of catalytic reactions.
- b) How does the concept of activation energy explain the role of catalyst.
- c) Explain phenomenon of catalysis. Give any three industrial application of catalysis.

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

- a) Differentiate between physical and chemical adsorption.
- b) Give assumptions of Langmuir Adsorption Isotherm.
- c) Describe Bredig's Arc method for preparation of sol.

P.T.O.

- Q4)** Answer any one of the following : [8]
a) Give characteristics of enzyme catalysis. Discuss Michaelis and Menten's enzyme mechanism in detail.
b) Give brief account of Adsorption chromatography and Adsorption indicators.

- Q5)** Write short notes on any two : [8]
a) Surfactants.
b) Aerosols.
c) Active centers.

SECTION - II

- Q6)** Define and explain the following terms : [8]
a) Limiting reactant
b) Internal energy.
c) Partial pressure
d) Mole fraction.

- Q7)** Answer any two of the following : [8]
a) Explain the material balance involved in extraction.
b) What is a closed system? Write and explain the energy balance equation for closed system.
c) State and explain Amagat's Law.

- Q8)** Write short notes on any two of the following : [8]
a) Heat of reaction.
b) Percent excess and conversion.
c) Different methods for material balance involving no chemical reactions.

- Q9)** Answer any one of the following : [8]
a) Define and explain the terms involved in phase rule and illustrate with example.
b) Discuss the effect of temperature and pressure on heat of reaction.

- Q10)** Solve any two of the following : [8]
a) Ethanol and water forms an azeotrope containing 96% by weight ethanol. Find the composition of azeotrope by mole.
b) 5 kg of oxygen contained in 1 m³ is heated without exceeding a pressure of 7 atm. Calculate maximum temperature attained by the gas.
c) A stream of nitrogen flowing at a rate of 100 kg mole/ hour is heated from 30° C to 100° C, Calculate the heat that must be transferred.

$$C_p^\circ$$

$$N_2 = 6.457 + 1.389 \times 10^{-3}T - 0.069 \times 10^{-6}T^2$$



P229

[4017]-30

F.Y. B.Sc. (Vocational)

BIOTECHNOLOGY

Voc - Biochemistry, Biophysics and Instrumentation

(45710) (Paper - I) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

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.*
- 4) *Use separate answer books for Section I and II.*

SECTION - I

(Biochemistry)

Q1) Answer the following questions in short **[8]**

- a) What is free energy?
- b) Give two examples of disaccharides.
- c) Define coenzyme.
- d) Write four factors affecting activity of Enzymes.

Q2) Answer any four of the following : **[16]**

- a) What are the functions of lipids?
- b) Describe the structure of amino acids.
- c) Explain how enzymes are useful in industry.
- d) Write a note on Kreb's cycle.
- e) Classify carbohydrates.

Q3) Answer any two of the following : **[16]**

- a) What is DNA? Describe the watson - crick model of DNA.
- b) Discuss the functions of proteins.
- c) How are enzymes classified?

P.T.O.

SECTION - II

(Biophysics and Instrumentation)

- Q4)** Answer the following : **[8]**
- a) What is condensor of a microscope? How is it useful?
 - b) Define buffer and give its role.
 - c) Define nephelometry.
 - d) State Lambert and Beer's law.
- Q5)** Attempt any four of the following : **[16]**
- a) Describe the lens system in a compound microscope and the total magnifications obtained.
 - b) Write a note on Dark field microscopy.
 - c) Write a note on paper chromatography.
 - d) Explain the working of pH meter.
 - e) How are radioisotopes useful in biological sciences.
- Q6)** Attempt any two of the following : **[16]**
- a) Describe visible spectrophotometer with a neat diagram.
 - b) Describe SEM.
 - c) What is centrifugation? How it is different from ultracentrifugation?



P230

[4017]-32

F.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

Test and Measuring Instruments and Consumer Products

(48110) (Paper - I) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following :

[8 × 2 = 16]

- a) The meter resistance $R_m = 1000 \Omega$ and $I_m = 1\text{mA}$. What will be value of R_{SH} to allow meter to read 100 mA?
- b) How is the Q of coil remains constant over a wide range of frequencies?
- c) What is accuracy and precision?
- d) What is loading effect?
- e) What is frequency range to cook food in microwave oven?
- f) What is typical current consumption in digital clock?
- g) What is spike? What is spike protector?
- h) What is circuit breaker? What are different types of circuit breakers?

Q2) Attempt any four of the following :

[4 × 4 = 16]

- a) Describe various limitations of measuring instruments.
- b) Explain telephone instrument.
- c) Explain electronic ignition system.
- d) Explain the working of digital voltmeter.
- e) For wein bridge oscillator $R_1 = R_3 = 1 \text{K}\Omega$; $C_1 = C_3 = 0.1\mu\text{F}$. Determine frequency of oscillation.

P.T.O.

Q3) Attempt any four of the following :

[4 × 4 = 16]

- Write a short note on Q meter.
- Explain in short : Digital Storage Oscilloscope.
- What is meggar? Explain.
- Explain working of electronic door bell.
- Explain working of servo stabilizer.

Q4) Attempt any two of the following :

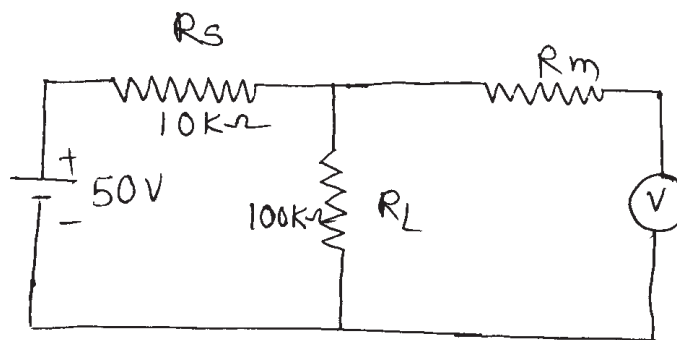
[2 × 8 = 16]

- Explain front panel controls of Dual Trace CRO.
- Describe the working of digital clock.
- What are advantages of digital Instruments over Analog Type.

Q5) Attempt any two of the following :

[2 × 8 = 16]

- What is UPS? Explain ON Line and OFF Line UPS.
- What is loading effect? How to avoid this effect? The two voltmeters are available with sensitivity of $1,000 \Omega/V$ and $20,000 \Omega/V$. Both meters are used on their 50 V voltage range. Calculate reading in each meter as well as error in each reading.



- Explain the working of single trace oscilloscope.



P231

[4017]-33

F.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

Instrumentation and Design & Manufacture of a Fermenter

(Theory Paper - I) (2008 Pattern) (48210)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *Answers to the two Sections should be written in separate answer books.*
- 2) *All questions are compulsory.*
- 3) *All questions carry equal marks.*
- 4) *Figures to the right indicate full marks.*
- 5) *Neat diagrams must be drawn wherever necessary.*
- 6) *Use of logarithmic tables, slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*
- 7) *Assume suitable data, if necessary.*

SECTION - I

Instrumentation

Q1) Attempt the following : **[8]**

- a) Define : "Sensitivity" of an instrument spectrophotometer as an example.
- b) Define : "Detection limit" of an instrument with an electronic balance as an example.
- c) Define : "Precision" of an instrument, with a suitable example.
- d) Define : "Accuracy" of an instrument, with a suitable example.

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

- a) State the Stoke's law as applied for a Centrifuge. Explain how 'g' is not necessarily directly proportional to the rpm of the machine.
- b) What is 'spiking' of a sample during an estimation process. Explain why it is done.
- c) List the different types of chromatography. Explain the principle of any one type.

P.T.O.

- Q3)** Answer any two of the following : [8]
- a) Draw a block diagram of a UV - visible range spectrophotometer. Explain its working.
 - b) State Darcy's equation. Describe the process for which it is applied.
 - c) Draw a diagram of tubular - bowl centrifuge. Explain its working.

- Q4)** Answer any two of the following : [8]
- a) What is Eh? How is it measured?
 - b) What are the factors that affect the pH of a solution.
 - c) Explain the principle of working of a nephelometer.

- Q5)** Answer any one of the following : [8]
- a) Write the Standard Operating Procedure for the operation of a visible range spectrophotometer.
 - b) Write the Standard Operating Procedure for the operation of a pH meter.

SECTION - II

Materials and Design of a Fermenter

- Q6)** Answer any four of the following : [8]
- a) What is a thermosetting plastic? Name any two thermosetting plastics.
 - b) Define biofouling.
 - c) Define microbial corrosion.
 - d) State how oligodynamic action of metals can affect a bioprocess?
 - e) State the following ratios of dimensions in a laboratory fermenter :
Diameter of the vessel to the width of a baffle :
Rushton turbine : Length of an impeller blade to its width :

- Q7)** Answer any two of the following : [8]
- a) What is butyl rubber? Explain the advantages of its use in bioreactor systems construction.
 - b) Explain the limitations of stainless steel for use in bioprocesses.
 - c) Explain the properties of borosilicate glass that make it compatible for use in bioprocesses.

Q8) Answer any two of the following : [8]

- a) Explain the properties of polypropylene that make it compatible for bioprocesses.
- b) Draw any one type of projection of a pyramid.
- c) Explain the properties of Teflon that make it suitable for use in bioprocesses.

Q9) Answer any two of the following : [8]

- a) What is a “mold”? Explain its use in construction of metal articles.
- b) Name three types of projection drawings of a 3-dimensional object. Draw any two of these.
- c) Draw any 3-dimensional object and mark the object and centre lines in it.

Q10) Answer the following : [8]

Draw a cube with a central spherical hole in it, in either its parallel perspective view **OR** in its angular perspective view.



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[4017]-34

F.Y. B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Essentials of Computers

(2008 Pattern) (Paper - I) (48710)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following :

[16]

- a) What is Instruction Cycle?
- b) Write full forms of : BCD, LCD, MODEM, DMA.
- c) Distinguish between Random and Sequential memory.
- d) What is ISR? How it is executed?
- e) What is POST?
- f) What is the difference between General and Special purpose registers?
- g) What is Microprocessor?
- h) What is Instruction fetch.

Q2) Attempt the following : (Any Four)

[16]

- a) Explain in brief : MOUSE
- b) Write a short note on : Integration Techniques.
- c) Differentiate between Maskable and Non - Maskable interrupts.
- d) Write a short note on Bar Code and handling of the material.
- e) What is i Ram?
- f) With help of block diagram explain 'CPU'.

P.T.O.

Q3) Attempt any Four : **[16]**

- a) Write a short note on 'Front and rear panel'.
- b) Explain utility tools and formatting in computers.
- c) What are device controllers?
- d) Write a short note on Inkjet printer.
- e) What is memory hierarchy?
- f) Why cooling techniques are required for microprocessors?

Q4) Attempt any Two : **[16]**

- a) Explain in detail power supply of computer. Give short notes on surge protector, MCB, stabiliser and UPS.
- b) Write a note on hardwired control unit with advantages and drawbacks.
- c) i) Comment on "Why unsaved data in computer is lost when power goes off"?
ii) Write a short note on 'Hard disk drive'?

Q5) Attempt any Two : **[16]**

- a) Write a note on 'Printers'. Detail 'LASER'?
- b) Explain in detail 'Motherboard and its components' and add on cards.
- c) i) Write a short note on 'Interlaced and non-interlaced scanning'.
ii) Write a short note on 'Memory modules'.



P233

[4017]-35

F.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

**Morphology, Seed Development and Testing for Cultivar Genuineness
(Paper - I) (48910) (2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following :

[8 × 2 = 16]

- a) Enlist the whorls of a typical flower.
- b) What is mega sporogenesis?
- c) Define Allogamy.
- d) What is a Fruit?
- e) Give the scope of plant breeding.
- f) Define natural vegetative propagation.
- g) State the law of independent assortment.
- h) Give any two applications of breeding for disease resistance.

Q2) Attempt any four of the following :

[4 × 4 = 16]

- a) Sketch and label L.S. of ovule.
- b) What is autogamy? Give its advantages and disadvantages.
- c) Describe the criterias for harvesting of seeds.
- d) Explain artificial mode of reproduction in plants.
- e) Comment on types of introduction.
- f) Write in brief about tissue culture.

Q3) Write notes on any four of the following :

[4 × 4 = 16]

- a) Development of male gametophyte.
- b) Difference between seed and grain.
- c) Dus system.
- d) Segregation.
- e) Clonal selection.
- f) Anther culture.

P.T.O.

Q4) Attempt any two of the following :

[2 × 8 = 16]

- a) Explain in detail classification of fruits.
- b) Discuss about biochemical tests used for examination of seed.
- c) Comment on mass selection.
- d) Describe in detail the process of pureline selection.

Q5) Give the distinguishing characters, floral formula and floral diagram of family fabaceae and Asteraceae. **[16]**

OR

What is hybridisation! Explain its technique in cross pollinated crops.



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[4017]-36

F.Y. B.Sc. (Vocational)

INDUSTRIAL CHEMISTRY - II

(2008 Pattern) (Paper - II) (45620)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *All questions carry equal marks.*
- 5) *Use of logarithmic tables, slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *All questions are compulsory.*

SECTION - I

Q1) Answer the following : **[8]**

- a) Define the term ignition temperature.
- b) Give disadvantages of liquid fuels.
- c) Give any two uses of coke.
- d) Define calorific value. Give examples.

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

- a) Write a short note on processing of crude petroleum.
- b) Give an account of petrochemicals derived from alkenes.
- c) Give the chemical constitution of coal.

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

- a) What is coal - tar? Give the major products obtained in refining of coal - tar and it's uses.
- b) Describe the synthesis of bio - gas.
- c) Write a short note on catalytic cracking.

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

- a) Describe in detail the proximate analysis of coal.
- b) Write a comparative account of coal - gas and coke - oven gas.

P.T.O.

- Q5)** Answer any one of the following : [8]
- a) What is meant by reforming? Discuss in detail.
 - b) Write a descriptive account on processing of industrial fuels.

SECTION - II

- Q6)** Answer the following : [8]

- a) Give the names of oils used as frothers in froth floatation process.
- b) Define slag. Give examples.
- c) Give two applications of zeolites.
- d) Define Electrometallurgy.

- Q7)** Attempt any two of the following : [8]

- a) What are silicates? Give their classification.
- b) With a suitable diagram describe the Blast furnace used in metallurgy of iron.
- c) Write a short note on clay.

- Q8)** Attempt any two of the following : [8]

- a) What is metallurgy? Give the different divisions of metallurgy.
- b) What is an Ore? Classify different types of Ores.
- c) Write a short note on alumina.

- Q9)** Answer any one of the following : [8]

- a) Discuss the principles of extraction of metals from sulphide Ores.
- b) What is reduction? Discuss different types of reduction processes used in metallurgy.

- Q10)** Answer any one of the following : [8]

- a) Write a descriptive account on thermodynamics of roasting.
- b) What is activated charcoal? Discuss its applications in detail.



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[4017]-37

F.Y. B.Sc. (Vocational)

BIOTECHNOLOGY

Microbiology and Mathematics, Statistics and Computer for Biologists

(Paper - II) (2008 Pattern) (45720)

Time : 3 Hours]

[Max. Marks : 80

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.*
- 4) *Use separate answer books for Section I and II.*

SECTION - I
(Microbiology)

Q1) Answer the following questions in short : **[8]**

- a) Give salient features of eukaryotes.
- b) What are fixatives? Give two examples.
- c) What are coliforms?
- d) Enlist any two methods of capsule staining of bacteria.

Q2) Attempt any four of the following : **[16]**

- a) Explain the five kingdom system of classification.
- b) Write short notes on :
 - i) Spread plate technique.
 - ii) Monochrome staining.
- c) Describe sterilization method by radiation.
- d) What are the contributions by Louis Pasteur to microbiology.
- e) Describe any one method of endospore staining of bacteria.

Q3) Answer any two of the following : **[16]**

- a) Enlist the steps involved in the test for coliforms. Describe the presumptive test.
- b) Differentiate between nutrient broth & nutrient agar. Also comment upon the role of each gradient.
- c) Define extremophiles. How thermophiles & acidophiles can be cultured in laboratory?

P.T.O.

SECTION - II

(Mathematics, Statistics and Computer for Biologist)

Q4) Attempt each of the following : **[8]**

a) If $y = x^{3/2} + \sin x$, find $\frac{dy}{dx}$.

b) Evaluate $\lim_{x \rightarrow 3} \frac{x^3 - 27}{x^2 - 9}$.

c) What is random sampling?

d) Define database.

Q5) Attempt any four of the following : **[16]**

a) If $y = \frac{e^x + \sin x}{1 + x^2}$, find $\frac{dy}{dx}$.

b) Evaluate $\int e^x \sec^2(e^x) dx$.

c) Evaluate $\lim_{x \rightarrow 3} \frac{x^2 - 5x + 6}{x^3 - 27}$.

d) Write a note on positive correlation.

e) Give applications of computer in industry.

f) Write a note on 't' test.

Q6) Attempt any two of the following : **[16]**

a) i) If $y = \frac{\tan x}{e^x + 1}$, find $\frac{dy}{dx}$.

ii) Evaluate $\int \frac{(1 - \log x)^2}{x} dx$.

- b) i) Discuss the convergence of the series.

$$\sum_{n=1}^{\infty} \frac{5n+3}{7n-8}$$

- ii) Find the limit of the sequence.

$$\left\{ \frac{5-n}{3n+7} \right\}_{n=1}^{\infty}$$

- c) Arrange given data in ascending order and calculate mean, mode, median and standard deviation.

18, 21, 12, 16, 22, 16, 13, 23, 15, 18, 17, 18, 19, 18, 20, 24, 18.

- d) Draw histogram and frequency polygon to present the following data.

45, 36, 37, 38, 32, 33, 23, 15, 31, 24, 32, 58, 54, 28, 12, 29, 52, 49, 40, 51, 36, 48, 46, 30, 45, 35, 11, 42.



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[4017]-39

F.Y. B.Sc. (Vocational)

ELECTRONICS EQUIPMENT & MAINTENANCE

Maintenance concepts & Assembly Methods

(2008 Pattern) (Paper - II) (48120)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following :

[16]

- a) Explain the term absolute maximum rating.
- b) Explain common faults that occur in inductors.
- c) Explain the advantages of double sided P.C.B.
- d) Explain P.T.H. PCB?
- e) Explain the importance of different packages & lead information.
- f) Explain the advantages of SMD.
- g) Enlist different tools required for soldering.
- h) Explain the advantages of Bread board.

Q2) Attempt any four

[16]

- a) Explain the advantages of ultrasonic soldering.
- b) Write a short note on solder material.
- c) Explain the difference between good solder joint & bad solder joint.
- d) Enlist different devices used for safety in domestic applications.
- e) Explain different types of wires.

P.T.O.

Q3) Attempt any four **[16]**

- a) Explain different stages for maintenance of a instrument.
- b) Explain the importance of Earthing & Explain the procedure of Earthing.
- c) Enlist different tools required for desoldering.
- d) Write a note on IF Transformers.
- e) Explain the importance of data sheets.

Q4) Attempt any two **[16]**

- a) With the help of a neat diagram explain the wiring of Regulator and a fan.
- b) Explain the working of M.C.B. also explain over load and short circuit test.
- c) Explain causes & remedies of dry solder & cold solder.

Q5) Attempt any two : **[16]**

- a) Write a note on Transformers.
- b) With the help of a neat diagram Explain the working of solder Iron.
- c) Explain the factors on which MTR (mean time to repair depends).



Total No. of Questions : 10]

[Total No. of Pages : 3

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[4017]-40

F.Y. B.Sc.

INDUSTRIAL MICROBIOLOGY

Microbial Diversity & Cultural Methods and Mathematics and Statistics for Biologists

(Theory) (Paper - II) (Vocational) (2008 Pattern) (48220)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *All questions are compulsory.*
- 3) *All questions carry equal marks.*
- 4) *Figures to the right indicate full marks.*
- 5) *Neat diagrams must be drawn wherever necessary.*
- 6) *Use of logarithmic tables, slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*
- 7) *Assume suitable data, if necessary.*

SECTION - I

Microbial Diversity and Cultural Methods

Q1) Attempt the following : **[8]**

- a) Define oligophiles & give their two important distinguishing characters.
- b) Name any two selective media with their respective selectively cultured organism.
- c) Enlist two methods of preservation of fungi.
- d) List any 2 algal cultivation methods.

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

- a) Describe in detail any two methods for cultivation of rotifers.
- b) What are extremozymes? Give their importance in industrial applications.
- c) Describe specific method for preservation of protozoa.

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

- a) Define minimal media and explain its utility with examples.
- b) What is SCP? Give its industrial importance.
- c) Write the source, properties and application of Taq polymerase.

P.T.O.

- Q4)** Answer any two of the following : [8]
- a) Describe natural habitat of methanogens with examples.
 - b) Explain design of anaerobic jar in detail.
 - c) List important culture collections and describe any one.

- Q5)** Answer any one of the following : [8]
- a) Describe basic types of culture media and explain the utility of dehydrated media with examples.
 - b) What is the meaning and importance of evolutionary lineage in prokaryote classification? Describe latest classification system with important examples.

SECTION - II

Mathematics and Statistics for Biologists

- Q6)** Answer any four of the following : [8]
- a) If a line has a constant slope m , what will be the slope of a line perpendicular to it?
 - b) Describe in brief : Pearson's coefficient of correlation.
 - c) Define
 - i) median.
 - ii) standard error.
 - d) Explain the meaning of
 - i) Biometry.
 - ii) Statistics.
 - e) Choose the correct option and complete the sentence.
Repetition of your result is called as _____.
 - i) Accuracy
 - ii) Hypothesis
 - iii) Precision
 - iv) Sensitivity

- Q7)** Answer any two of the following : [8]
- a) If two bacterial cultures start growing at the same time with identical number of cells and one of them has a doubling time of one hour and the other has a doubling time of 30 minutes, after how much time the population of the fast growing organism will be 1000 times that of the slow grower.
 - b) Explain mathematically : Hardy - Weinberg equilibrium.
 - c) Alpha particles are emitted by a radioactive source at the rate of three per every minute on the average. Calculate the probability of getting exactly 5 emissions in a given minute.

Q8) Answer any two of the following : **[8]**

- a) Ten plants have been assessed in *Seasam* for plant height (cm) and number of branches per plant. From the given data find out whether there is any correlation between the variables.

Plant height (cm)	Branches per plant
10	12
15	16
20	20
22	25
30	35
35	40
40	45
45	50
50	52
55	60

- b) Explain the terms :
- i) Mean
 - ii) Mode
 - iii) Median
 - iv) Standard error
- c) If the birth rate as well as death rate of a population are constant, will the population attain equilibrium? Justify your answer.

Q9) Answer any two of the following : **[8]**

- a) Explain Degree of freedom and confidence limit giving appropriate examples.
- b) Test whether prevalence of carriers of *Filaria* is associated with sex

Sex	No of carriers	No of non carriers.
Male	78	412
Female	57	553

- c) Describe binomial distribution with examples.

Q10) Answer any two of the following : **[8]**

- a) Explain importance of sampling in hypothesis testing.
- b) Give a prerequisites and methodology of a scientific inquiry.
- c) Write a set of equations to describe growth of a bacterial population in a batch culture with limited nutrients.

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[4017]-41

F.Y. B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Computer Organisation

(2008 Pattern) (Paper - II) (48720)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following :

[16]

- a) Define Microprocessor.
- b) What is LAN?
- c) Explain Linker, Loader.
- d) What is flow chart?
- e) What is USB?
- f) Explain any two external DOS commands.
- g) What is Hardware?
- h) What is Firmware?

Q2) Attempt any four

[16]

- a) Explain different types of software.
- b) With diagram, explain logical system architecture of computer.
- c) Explain Arithmetical & Logical instructions of 8086.
- d) Define the terms:
 - i) Simulator.
 - ii) Emulator.
 - iii) Editor.
 - iv) Debugger.
- e) What is Device driver?
- f) State flag register format of 8086 & explain each bit in brief.

P.T.O.

Q3) Attempt any four

[16]

- a) Compare Hardware, Software & firmware.
- b) What is multimedia?
- c) Explain features of 80386 microprocessor.
- d) Explain FDC with block diagram.
- e) What is Algorithm? Explain with example.
- f) Define - protocols.

Q4) Attempt any two

[16]

- a) Write notes of Network operating system.
- b) Write short note on buffer, tristate buffer and explain the need of buffer.
- c) List different network topologies, explain any two in detail.

Q5) Attempt any two

[16]

- a) Explain Architecture of 8086 with block diagram.
- b) Explain operating system and its main functions.
- c) Write short notes on
 - i) Main functions of DOS.
 - ii) Internet.



Total No. of Questions : 5]

[Total No. of Pages : 2

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[4017]-42

F.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

Seed Physiology and Seed Production

(48920) (Paper - II) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following :

[16]

- a) Define Seed.
- b) What is Seed Dormancy?
- c) Define Seed Vigour.
- d) What is Seed ageing?
- e) What are breeders seeds?
- f) Enlist sources of irrigation.
- g) What is trans planting?
- h) Enlist crops requiring trans plantation of seedlings.

Q2) Attempt any four of the following :

[16]

- a) Define Seed Germination. Explain types of seed germination.
- b) Comment on seed deterioration during storage.
- c) Explain various factors affecting seed vigour.
- d) Describe various types of soil.
- e) Explain various methods of irrigation.
- f) Comment on general system of seed multiplication.

P.T.O.

Q3) Write notes on any four of the following : **[16]**

- a) Physiology of seed development.
- b) Synthesis of food reserves.
- c) Orthodox seeds.
- d) Seed as a basic input in agriculture.
- e) Selection of land for seed production.
- f) Protection of seedlings in nursery.

Q4) Attempt any two of the following : **[16]**

- a) Explain various methods to break seed dormancy.
- b) Give an account of production of synthetic seeds.
- c) Comment on quality of irrigation water in seed production.
- d) Describe various methods of sowing for straight varieties.

Q5) Give an account of invigoration treatment to improve seedling establishment and its effect on planting value. **[16]**

OR

Define genetic purity of seeds? Explain various methods to maintain genetic purity of seeds.



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[4017]-31

F.Y. B.Sc. (Vocational)

PHOTOGRAPHY AND AUDIO - VISUAL PRODUCTION

Basic Photography and Appreciation of Media

(Paper - I) (2008 Pattern) (48010)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Answer the following in short.

[16]

- a) What are the limits of the visible spectrum?
- b) Explain what is equivalent exposure.
- c) Mention at least four technical qualities of a photographic image.
- d) Explain the difference between diffraction and refraction of light.
- e) What is the function of the focusing screen used in a SLR camera?
- f) What is the range of the infrared spectrum?
- g) Explain what you mean by a sharp image.
- h) Draw a diagram to show chromatic aberration.

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

[16]

- a) Mention two advantages and two disadvantages of a focal plane shutter.
- b) Draw a diagram and explain what you mean by spherical aberration. How is it reduced?
- c) Define f number. Write down the f number scale.
- d) Draw a diagram and show how an unsharp image looks with the different focusing aids.
- e) Define shutter speed. What is the use of slow shutter speed?

P.T.O.

Q3) Answer **any four** of the following : **[16]**

- a) Draw a diagram and differentiate between glossy and matte surface.
- b) What is the use of the mirror in a SLR camera?
- c) Discuss the advantages and disadvantages of a box camera.
- d) Draw a diagram and describe a pinhole camera.
- e) What are the features of a camera lens?

Q4) Answer **any two** of the following : **[16]**

- a) How is photography important in different fields of life?
- b) Discuss the role of photography as a medium of mass communication. Give suitable examples.
- c) Discuss the role of a photographic image in a news paper.

Q5) Answer **any one** of the following : **[16]**

- a) What are elements of composition? How are they important in a photographic image?
- b) Draw a neat and labeled diagram and describe a SLR camera.



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[4017]-38

F.Y. B.Sc. (Vocational)

PHOTOGRAPHY AND AUDIO - VISUAL PRODUCTION

Introduction to Mass Communication and Media Scene in India

(Paper - II) (2008 Pattern) (48020)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt ANY TWO of the following : **[16]**

- a) Discuss how radio is important medium of communication.
- b) Discuss the organizational structure of a news paper.
- c) What do you understand by 'News Value' and what are the various news values?

Q2) Attempt ANY FOUR of the following : **[16]**

- a) Explain why are gate keepers necessary in mass communication.
- b) Discuss the internet as a medium of mass communication.
- c) Write a short note on 'inverted pyramid'.
- d) Write a short note on Lass well's model.
- e) An interviewer should be "Jack of All". Explain with examples.

Q3) Attempt ANY FOUR of the following : **[16]**

- a) What is the role of an Editor in a news paper?
- b) Explain what is proxemics.
- c) What is a tabloid? Discuss with suitable examples.
- d) Write a script of 15 minutes programme on one of the following themes with appropriate three songs:
 - i) Navratri Utsav,
 - ii) Duet songs.
- e) Explain, with suitable example, interpersonal communication.

P.T.O.

Q4) Attempt ANY TWO of the following : [16]

- a) Discuss the role of media in social movement.
- b) What are different research methods? Discuss any one with suitable examples.
- c) Draw a block diagram and discuss Communication as a process by taking suitable examples.

Q5) Attempt ANY TWO of the following : [16]

- a) What is the role of a Producer in a news channel? How does it compare with the role of the editor of a Newspaper?
- b) What are different 'shots' used in a video production.
- c) Discuss the importance of preproduction stage in a video production.



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[4017] - 18

F.Y. B.Sc.

MICROBIOLOGY

Basic Techniques in Microbiology

(Paper - II) (2008 Pattern) (41920)

Time :3 Hours]

[Max. Marks :80

Instructions to the candidates:-

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

Q1) Attempt the following:

[16]

- a) Enlist the components of first aid box.
- b) Numerical aperture value of high power objective is _____ .
- c) Which mordant is used in Gram staining.
- d) Enlist any two corrosive chemicals used in laboratory.
- e) Define growth rate of bacteria.
- f) Glass lenses are not used in Electron microscope - state true / false.
- g) What are photo autotrophs.
- h) Dry heat is used in sterilisation of vaccines and sera – True / false.

Q2) Attempt any four of the following:

[16]

- a) Explain the principle and methodology of monochrome staining.
- b) Define enrichment media. Explain any one in detail.
- c) Explain comma and astigmatism as types of aberration.
- d) Explain how spread plate technique is used for enumeration of bacteria.
- e) Describe the mode of action of ionising and non-ionising radiations.
- f) Enlist various mechanical parts of compound microscope and write their functions.

P.T.O

Q3) Attempt any four of the following: [16]

- a) Justify - MacConkey's agar is selective as well as differential media.
- b) With a proper ray diagram explain principle of fluorescence microscope.
- c) Define synchronous culture. Explain any one method to obtain synchronous culture.
- d) What is the significance of oil immersion objective in microscope.
- e) Write the principle and methodology of Acid -fast staining.
- f) Describe the mode of action of :
 - i) Quarternary ammonium compounds.
 - ii) Aldehydes.

Q4) Attempt any two of the following: [16]

- a) Explain the nutritional classification of bacteria on the basis of their carbon and energy sources.
- b) Define aberration. Explain chromatic aberration in detail.
- c) Enlist different chemical agents used for sterilization and disinfection. Explain any two with their mode of action.
- d) Enlist different ingredients of media with their role.

Q5) Attempt any one: [16]

- a) With a proper ray diagram explain principle, working and applications of phase contrast microscope.
- b) Enlist different phases and subphases of growth curve of bacteria and derive an expression for generation time.



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[4017]-13

F.Y. B.Sc.

STATISTICS / STATISTICAL TECHNIQUES

Descriptive Statistics

(Paper - I) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of statistical tables and calculator is allowed.*
- 4) *Symbols have their usual meanings.*
- 5) *Graph papers will be supplied on request.*

Q1) a) Choose correct alternative for the following : **[4 × 1 = 4]**

i) Which one of the following is not a source of secondary data :

- | | |
|--------------------|-----------------------|
| A) Office records. | B) Reports. |
| C) Bulletins | D) Direct interviews. |

ii) With the help of histogram one can determine :

- | | |
|---------|-----------|
| A) Mean | B) Median |
| C) Mode | D) S.D. |

iii) For a moderately skewed distribution mean is 35 and median is 27, the mode of the distribution is :

- | | |
|-------|-------|
| A) 11 | B) 25 |
| C) 15 | D) 30 |

iv) If corr. $(x, y) = 0.5$, then
corr. $(2x + 3, y - 5)$ is :

- | | |
|---------|---------|
| A) 0.10 | B) -2.5 |
| C) 0.5 | D) 1.0 |

b) State whether the following statements are true or false : **[4 × 1 = 4]**

- i) If $V_2 = 0$, the distribution is leptokurtic.
- ii) Regression coefficients are always reciprocals of each other.
- iii) Index numbers are called as economic barometers.
- iv) Standard deviation (S.D) is dependent on change of origin.

P.T.O.

- c) Define harmonic mean and state its formula for individual observations. [2]
- d) If $\bar{X} = 5$, $\bar{Y} = 3$ and by $X = 0.6$, obtain the regression estimate of Y given that $X = 3$. [2]
- e) State any two demerits of arithmetic mean. [2]
- f) Is the following data consistent? [2]
 $N = 300$, $(A) = 200$, $(B) = 160$, $(AB) = 50$.

Q2) Attempt any four of the following : [4 × 4 = 16]

- a) Mean monthly salary paid to all the doctors of a hospital is Rs. 30000. Mean monthly salary paid to specialized doctors is Rs. 32000, while it is Rs. 22000 for the resident doctors. Determine the percentage of specialized and resident doctors.
- b) Height in c.m. of 20 students are given below :
 171, 163, 153, 151, 163, 181, 143, 148, 151, 154, 159, 157, 148, 149, 154, 155, 148, 153, 154, 164.
 Prepare stem and leaf chart.
- c) Explain the general guidelines of choosing the classes.
- d) Discuss the effect of change of scale on variance and S.D.
- e) State the requirements of a good measure of central tendency.
- f) Obtain an expression for 4th central moments in terms of raw moments.

Q3) Attempt any four of the following : [4 × 4 = 16]

- a) Explain the procedure of drawing a sample using two stage sampling.
- b) Show that , $S.D. \geq M.D.$ (about mean).
- c) For a frequency distribution bowley's coefficient of skewness is 0.6. The sum of lower and upper quartiles is 100 and the median is 38, find the two quartiles.
- d) Prices of tea of grade I and grade II are Rs. 200 per Kg. and Rs. 300 per Kg. respectively. If they are mixed together in the ratio 3 : 2, find average price of the mixture.
- e) Compute the weight associated with house-rent, if the group index number of all groups together is 267.

Group	Food	Clothing	Fuel	House-rent	Others
Index numbers	300	200	250	150	250
Weights	62	4	6	—	16

- f) If $a > 0$, $b > 0$ find the spearman's rank correlation coefficient between X and Y, given that :

X	a	a + 2	a + 5	a + 10	a + 12
Y	b + 3	b + 1	b - 2	b	b - 3

Q4) Attempt any two of the following : **[2 × 8 = 16]**

- a) Derive the formula for mode for a continuous frequency distribution.
- b) What is correlation? Explain its different types with real - life examples. Also show that the correlation coefficient always lies between -1 to $+1$.
- c) Explain the terms :
 - i) Dichotomy
 - ii) Ultimate class frequency.
 - iii) Independent of two attributes.
 - iv) Order of a class.
- d) i) Calculate Fisher's Ideal Index - number for the following data :

Commodity	p_0	q_0	p_1	q_1
A	4	5	12	3
B	4	4	6	4
C	2	3	3	5

- ii) Find 20% trimmed mean for the following data :
20, 30, 35, 37, 39, 42, 40, 34, 50, 15.

Q5) Attempt any two of the following : **[2 × 8 = 16]**

- a) Let (X_i, Y_i) , $i = 1, 2, \dots, n$ are n observations on a bivariate random variable (X, Y) . Derive the equation of line of regression of Y on X.
- b) With usual notations derive the following formula of rank correlation coefficient (R) in case of noties,

$$R = 1 - \frac{6 \sum di^2}{n(n^2 - 1)}$$

- i) If $n = 100$, $\sum X = 550$ and $\sum X^2 = 45060$, find S.D. and C.V.
- ii) Given that $\beta_1 = 0.20$, $\beta_2 = 2.8$ and $\mu_2 = 1.2$ find μ_3 and μ_4 .

- d) i) Explain the term skewness and give its any two measures.
- ii) Out of 800 students 320 are economically backwards. Amonge 240 students who failed, 96 were economically backwards. Find the coefficient of association between the attributes economically backward and failure in examination. Comment on it.



P205**[4017]-4****F.Y. B.Sc.****PHYSICS - II****Emerging Physics and Electricity and Magnetism****(41220) (Paper - II) (2008 Pattern)***Time : 3 Hours]**[Max. Marks : 80**Instructions to the candidates:*

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

Q1) Attempt all of the following :

- a) Find the cardiac output for a person having heart rate 90 beats per min. and stroke volume 80 ml per beat. [2]
- b) What is population inversion in Laser? [2]
- c) What is geocentrism? [2]
- d) What is thermister? [2]
- e) What do you mean by electric field? [2]
- f) A proton is projected with speed of 3×10^6 m/s horizontally from east to west. A uniform magnetic field \vec{B} of strength 4×10^{-3} T exists in vertically upward direction. Find the force on proton just after its projection.
(Given : $q = 1.6 \times 10^{-19}$ C). [2]
- g) Give the relation between three magnetic vectors. [2]
- h) Define time constant of a RC circuit. [2]

Q2) Attempt any four of the following :

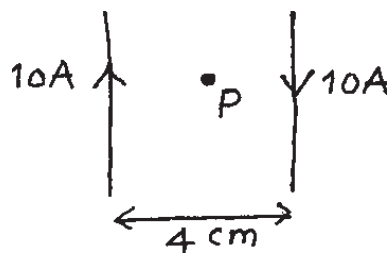
- a) Give contributions of Einstein in physics. [4]
- b) Explain He – Ne laser with neat diagram. [4]
- c) Explain the working principle of pyrometer and give different types of pyrometer. [4]
- d) Find the relative population of two states in a ruby laser that produces a light beam of wavelength 6943 \AA at 300°K .
(Given : $h = 6.626 \times 10^{-34}$ Js, $C = 3 \times 10^8$ m/s) $k = 8.61 \times 10^{-5}$ e V/ $^\circ\text{K}$ [4]

P.T.O.

- e) The intracellular K^+ concentration of a group of cells averages 160×10^{-6} moles/cm³. The extra cellular concentration of K^+ averages 6.5×10^{-6} moles/cm³. Calculate Nernst potential. [4]
- f) Calculate band gap of 5 silicon atoms if energy gap of silicon atom is 1.1eV. [4]

Q3) Attempt any four of the following :

- a) State Coulomb's law. Express it in vector form. [4]
- b) Using Biot-Savart's law, obtain an expression for the magnetic induction at a point on the axis of a current carrying circular loop. [4]
- c) Explain Magnetization and magnetic intensity. [4]
- d) Calculate the electric intensity due to a point charge 3×10^{-8} coulomb at a point which is at a distance of 20 cm from it.
(Given : $\epsilon_0 = 8.85 \times 10^{-12}$ C²/N – m²) [4]
- e) An electric dipole consisting of two opposite charges each of magnitude $2 \mu\text{C}$ is separated by a distance of 2cm. The dipole is placed in an external field of intensity 2×10^5 N/C. Calculate the maximum torque on the dipole. [4]
- f) The figure shows two long straight wires carrying electric currents 10 A in opposite directions. The separation between the wires is 4cm. Find magnetic field at the point P midway between the wires.
(Given : $\mu_0 = 4 \pi \times 10^{-7}$ Wb/A.m) [4]



Q4) Attempt any two of the following :

- a) Define nanotechnology. State its applications in various disciplines. [8]
- b) i) Give the contributions of C.V. Raman and Satyendra Nath Bose in Physics. [4]
- ii) The resistance of platinum wire is 6 ohms at 0°C and 7.2 ohms at 100°C. Calculate the temperature coefficient of resistance α . [4]

- c) i) What is ECG? Draw ECG curve and interpret it. [4]
ii) At what wavelength are the rates of spontaneous and stimulated emission are equal at 600°K?
(Given : $h = 6.626 \times 10^{-34}$ Js, $C = 3 \times 10^8$ m/s, $k = 1.38 \times 10^{-23}$ J/°K) [4]

Q5) Attempt any two of the following :

- a) State and prove Gauss's law in dielectrics. [8]
- b) i) State the principle of superposition and obtain an expression for force on any one charge due to all other charges. [4]
ii) The maximum value of the permeability of some metals is 0.130 T-m/A. Find the value of maximum relative permeability and susceptibility.
(Given : $\mu_0 = 4\pi \times 10^{-7}$ T-m/A) [4]
- c) i) Explain the term magnetic field lines. Draw field lines produced by a permanent magnet. [4]
ii) What resistance must be connected in series with an inductor of 6 mH, so that the circuit has a time constant of 2×10^{-3} S? [4]



P206**[4017]-5****F.Y. B.Sc.****CHEMISTRY - I****Physical and Inorganic Chemistry****(Paper - I) (2008 Pattern) (Theory) (41310)***Time : 3 Hours]**[Max. Marks : 80**Instructions to the candidates:*

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

Q1) Answer the following questions :**[16]**

- a) Calculate the pH of 3.2×10^{-3} M HCl solution.
- b) Define the terms viscosity and surface tension.
- c) What are micells? Give two examples of it.
- d) Give two examples of heterogeneous catalysis.
- e) Explain the terms spontaneous and non spontaneous processes.
- f) State type of hybridisation and shape of following :
 - i) BF_3 .
 - ii) SF_6 .
- g) Convert 26.5 gms H_2SO_4 in moles.
(At. wt.H = 1, S = 32, O = 16)
- h) Define covalent bond and ionic bond.

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

- i) If $10^x = 0.3516$. Find the value of x .
- ii) Find the value of $\log_e 140$.
- iii) Determine the co-ordinates of the point of intersection of the two lines $x + y = 1$ and $y = x + 2$.
- iv) Show that the lines $y = 3x + 9$ and $2y = 6x + 7$ are parallel.
- v) If $y = (x^3 - 4)^4$, $dy/dx = ?$
- vi) State any four rules of derivative.

vii) $\int \frac{x^2 - x^3 + x^4 - x^5}{x} dx$.

viii) $\int_2^4 x^2 dx$

P.T.O.

- b) What is vapour pressure of liquid? Describe isoteniscope method for measurement of vapour pressure. [4]
- c) Attempt any one of the following : [4]
- The vapour pressure of water at 293K and 313K are $2.34 \times 10^{-3} \text{ Nm}^{-2}$ and $7.38 \times 10^3 \text{ Nm}^{-2}$ respectively. Calculate the heat of vapourization of water. Given $R = 8.314 \text{ J mole}^{-1} \cdot \text{K}^{-1}$.
 - Calculate the entropy change when one mole of an ideal gas is heated from 100°C to 200°C at constant pressure and c_p is $7.88 \text{ Cal. deg}^{-1} \cdot \text{mole}^{-1}$.

- Q3)** a) Attempt any three of the following : [12]
- State and explain the assumptions of Bohr's theory.
 - Define cyclic process. Explain how the efficiency is obtained in carnot cycle.
 - Obtain the values of a , b and R in terms of P_c , V_c and T_c .
 - Explain the adsorption theory of heterogeneous catalysis.

- b) Attempt any one of the following : [4]
- Write down the electronic configuration of the following :
 - Na.
 - Cl^- .
 - Ni.
 - Ca.
 - The wavelength of a red light is 650nm. Calculate its frequency and wave number.

- Q4)** a) Attempt any three of the following : [12]
- What is a colloid? Distinguish between Lyophillic and lyophobic colloids.
 - Explain the set of four quantum numbers.
 - What are promoters and active centres? Explain with suitable example.
 - Explain the various types of catalysis with examples.
 - State and explain Aufbau's principle and Hund's rule of maximum multiplicity.

- b) Attempt any one of the following : [4]
- Explain the types of Hydrogen bond with suitable example.
 - What is SP^3d hybridization? Explain with suitable example.

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

- i) How is heavy water prepared? Mention its uses.
- ii) Explain the formation of O_2 molecule on the basis of the overlap of atomic orbitals.
- iii) How will you prepare the following solutions :
 - A) 275 ml of 0.6 N H_2SO_4 solution.
 - B) 900 ml of 0.25 M KOH solution.

(Given : atomic wts of H = 1, S = 32, O = 16, K = 39)

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

- i) Explain the process of bond formation on the basis of atomic orbital overlap. Give the factors which affect magnitude of overlap of atomic orbitals.
- ii) Explain the bonding and shape of H_2O and H_2S molecules on the basis of VSEPR theory.
- iii) 18 ml 1N H_2SO_4 , 15 ml 2 N HCl, 8 ml 0.25N HNO_3 and 50 ml 0.6N solution made upto 100 ml. Is the solution acidic or alkaline? Express the acidity and alkalinity in terms of normality.



P207

[4017]-6

F.Y. B.Sc.

CHEMISTRY - II

Organic and Inorganic Chemistry

(2008 Pattern) (Theory) (41320) (Paper - II)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Answer the following questions :

[16]

- a) Draw Zig-Zag structures for following compounds.
 - i) Phenyl alanine.
 - ii) Glycine.
- b) How organic compounds differ from inorganic compounds?
- c) 2-propanol gives positive iodoform test. Explain.
- d) Fumaric acid when heated at 300°C gives Maleic anhydride. Explain.
- e) In benzene all carbon carbon bondlengths are identical. Explain.
- f) What is oxidation number of
 - i) Cr in $K_2Cr_2O_7$
 - ii) P in $Ca_3(PO_4)_2$
- g) Alkaline earth metals are reactive elements. Explain.
- h) Draw the structures of following :
 - i) XeF_2
 - ii) XeO_4

Q2) a) Attempt any two of the following :

[8]

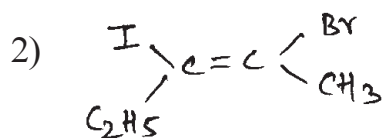
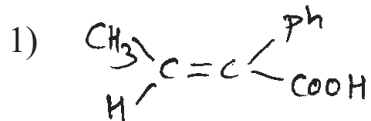
- i) How will you distinguish between phenol and ethanol?
- ii) What is hyper conjugation? Show different hyper conjugative structures of methyl benzene.
- iii) Discuss the conformational isomerism in n-butane with energy profile diagram.

P.T.O.

- b) Attempt any two of the following : [8]
- i) What are symmetrical and unsymmetrical ethers? How will you prepare ethers by using
 - 1) Alkyl halide.
 - 2) Diazomethane.
 - ii) What is Friedel Craft acylation? How is it carried by using
 - 1) Acyl halide.
 - 2) Carboxylic acid?
 - iii) Explain following reactions of alkanes with suitable examples.
 - 1) Combustion.
 - 2) Cracking.

Q3) a) Answer any two of the following : [8]

- i) What is Lucas reagent? How will you distinguish primary, secondary and tertiary alcohols by this reagent.
- ii) Draw resonance forms of the following molecules.
 - 1) Phenol.
 - 2) Aniline.
- iii) Assign E and Z configuration of following compounds.

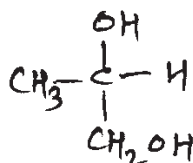


- iv) Only acetylene on hydration with $\text{H}_2\text{SO}_4/\text{H}_9\text{SO}_4$ gives aldehydes, all other alkynes gives ketones. Explain.

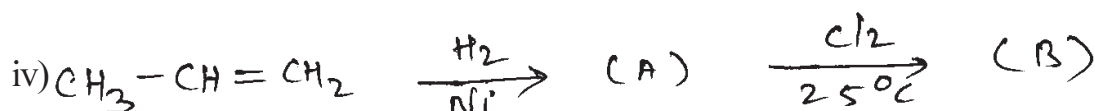
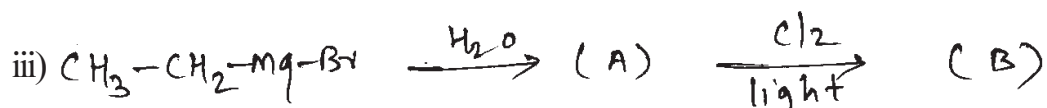
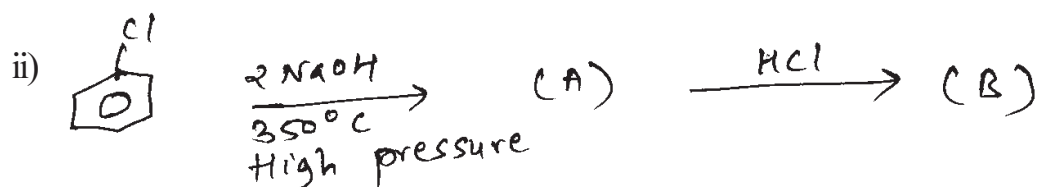
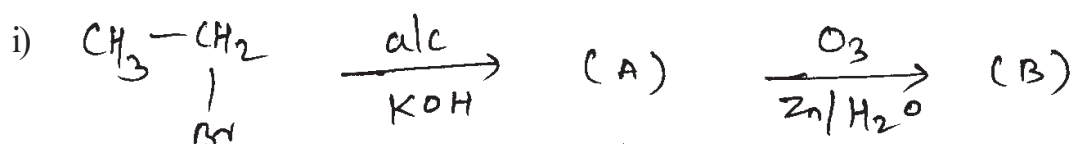
- b) Attempt any two of the following : [8]
- i) What is inductive effect? Explain +I and -I effects with suitable examples.
 - ii) How will you prepare Grignard's reagent from methyl bromide? What is the action of this reagent on following compounds.
 - 1) Formaldehyde.
 - 2) 2-propanone.
 - iii) Write short notes on :
 - 1) Ozonolysis.
 - 2) Racemisation.

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

- i) Draw all possible isomers of the compounds having molecular formula C_4H_{10} .
- ii) Define the following :
 - 1) Hydrogen bonding.
 - 2) Dihedral angle.
- iii) Draw the structures for the following compounds.
 - 1) 3-Chloro-2-Methyl pentane.
 - 2) 2,2-dimethyl butane.
- iv) Assign R or S configuration of following :



b) Identify the products A and B and rewrite the reactions (any two) : [4]



c) Attempt any one of the following : [6]

- i) What do you understand from
 - 1) Quantum number.
 - 2) Aufbau principle.
 - 3) Hund's rule.

- 4) Pauli's exclusion principle.
 - 5) Electron configuration.
 - 6) Heisenberg's uncertainty principle.
- ii) Beryllium shows anomalous behaviour in the family of alkaline earth metals, explain.

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

- i) Calculate the screening constant 'S' and Z^* for the valence electron of Nitrogen ($Z = 7$).
- ii) Define "valency" and "oxidation number" with suitable example.
- iii) Give the names and electronic configuration of noble gases.

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

- i) Discuss the bonding and shape of
 - 1) XeO_3
 - 2) $[\text{XeO}_6]^{4-}$
- ii) What are alkali metals? Explain family relationship of alkali metals with reference to following properties.
 - 1) Size of atom and ion
 - 2) Ionisation potential.
- iii) Draw the skeleton of periodic table and give location of following in it.
 - 1) VA.
 - 2) Be
 - 3) IIB
 - 4) F
 - 5) f block elements.



P210

[4017] - 9

F.Y. B.Sc.

ZOOLOGY

**Non - Chordates and Chordates
(2008 Pattern) (Theory) (Paper - I) (41510)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

SECTION - I

(Non - Chordates)

Q1) Define / Explain (Any Ten) :

[10]

- a) Taxonomy.
- b) Spicules.
- c) Barrier reef.
- d) Dactylozoid.
- e) Cyclosis.
- f) Regeneration.
- g) Immunology.
- h) Species.
- i) Polymorphism.
- j) Biophysics.
- k) Coelom.
- l) Bioluminescence.

Q2) Write short notes on (Any Three) :

[15]

- a) Trichocysts in Paramecium.
- b) Syconoid type of canal system.
- c) Pearl formation in pearl oyster.
- d) Mullerian mimicry.
- e) Linnaean Hierarchy.

P.T.O.

Q3) Attempt the following :

[15]

- a) Explain the radial symmetry in cnidaria.
- b) Mention the general characters of Mollusca.
- c) Give the importance of Vermiculture.

OR

What is conjugation? Describe the process and significance of conjugation in Paramecium.

SECTION - II
(Chordates)

Q4) Define / Explain (Any Ten) :

[10]

- a) Chordata.
- b) Diadromous migration.
- c) Placenta.
- d) Aestivation.
- e) Anura.
- f) Osteichthyes.
- g) Fish glue.
- h) Spermatogenesis.
- i) Basophils.
- j) Brow spot.
- k) Herbivorous.
- l) Digestion.

Q5) Write notes on (Any Three) :

[15]

- a) Economic importance of petromyzon and myxine.
- b) Functions of skin of frog.
- c) Aerial adaptations in birds.
- d) Duck billed platypus.
- e) Dorsal and ventral view of heart of frog.

Q6) Attempt the following :

[15]

- a) Give general characters of mammalia.
- b) Sketch and label the parts of respiratory system of frog.
- c) Describe general organisation of cyclostomata.

OR

Describe arterial system of frog.



P211

[4017] - 10
F.Y. B.Sc.
ZOOLOGY
Genetics and parasitology
(41520) (2008 Pattern) (Theory) (Paper - II)

Time : 3 Hours]

[Max. Marks : 80

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.*

SECTION - I
(Genetics)

Q1) Define | Explain the following (Any Ten) : **[10]**

- a) Phenotype.
- b) SAT chromosome.
- c) Stem cell
- d) Hypertrichosis.
- e) Acrocentric chromosome.
- f) Dihybrid cross.
- g) Cytoplasmic inheritance.
- h) Gene.
- i) Law of Independent Assortment.
- j) Polygenic inheritance.
- k) Hypoploidy.
- l) Sex influenced genes.

Q2) Write short notes on (Any Three) : **[15]**

- a) Turner's syndrome.
- b) Phenylketonuria.
- c) Positive eugenics.
- d) Lampbrush chromosome.
- e) Translocation.

P.T.O.

Q3) Attempt the following : **[15]**

- a) Explain the inheritance of inhibitory genes (13 : 3 ratio).
- b) What is sex determination? Explain zz - zw method of sex determination.
- c) A man with blood group B, whose parents have blood groups B and O, marries a woman with blood group B. But her parents have blood group AB and O. Work out the possible blood groups which the children of the couple can have.

OR

Define euploidy. Explain the various types of euploidy. Add a note on its significance.

SECTION - II
(Parasitology)

Q4) Define | Explain the following (Any Ten) : **[10]**

- a) Medical Entomology.
- b) Commensalism.
- c) Parasite.
- d) Humoral immunity.
- e) Hyperplasia.
- f) Repair.
- g) Anthrax.
- h) Sporogony.
- i) Schizont.
- j) Taeniasis.
- k) Redia larva.
- l) Intermediate host.

Q5) Write short notes on (Any Three) : **[15]**

- a) Avian Influenza.
- b) Toxoplasmosis.
- c) Parasitic effects of Sarcoptes scabiei.
- d) Control measures of Plasmodium vivax.
- e) Pathogenicity of Ascaris lumbricoides.

Q6) Attempt the following :

[15]

- a) Explain structural host specificity with suitable example.
- b) Write in detail about any five effects of parasite on host.
- c) Explain any five parasitic adaptations in endoparasites.

OR

Explain in detail the life cycle of Wuchereria bancrofti. Add a note on its pathogenecity and control measures.



P212

[4017] - 11
F.Y. B.Sc.
GEOLOGY
Mineralogy and Petrology
(41610) (2008 Pattern) (Paper - I)

Time : 3 Hours]

[Max. Marks : 80

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) Answer the following questions :

[16]

- a) Define twinkling.
- b) What is petrography?
- c) What is chalcophile?
- d) What is marble?
- e) Define sedimentary rock.
- f) What is Isomorphism?
- g) Define fracture.
- h) What is optical mineralogy?

Q2) Answer the following questions (Any Four) :

[16]

- a) Explain the process of oxidation and supergene enrichment in the formation of minerals.
- b) Explain the Ionic bonding in minerals with suitable examples.
- c) Describe the Nesosilicate structure with suitable examples.
- d) Explain the Radioactive properties of minerals.
- e) Give an account of minerals used in fertilizer industry.
- f) What is petrological microscope? Differentiate between petrological microscope and other microscope.

P.T.O.

Q3) Answer the following questions (Any Four) : **[16]**

- a) Describe the Argillaceous sedimentary rocks.
- b) Explain the formation of crystal and glass.
- c) Describe the clastic texture in sedimentary rocks.
- d) Explain the schistose structure in metamorphic rocks.
- e) Give the diagnostic characters of Igneous rocks.
- f) Explain the thermal metamorphism with suitable examples.

Q4) Answer the following questions (Any Two) : **[16]**

- a) Give the silicate structure, chemical composition, physical and optical properties of 'Hornblende'.
- b) Explain the vesicular and amygdaloidal structure.
- c) What is Double refraction of light? Explain the Double refraction of light with the help of calcite crystal.
- d) Explain the tabular classification of sedimentary rocks.

Q5) Give the crystallographic axes, elements of symmetry, definition with indices of various forms present in Hexagonal system, type Beryl. **[16]**

OR

- a) State the different physical properties of minerals. Explain Mohs' scale of Hardness and its use in determining the hardness of minerals.
- b) What are the agents of metamorphism? Explain them in detail.



P213

[4017] - 12

F.Y. B.Sc.

GEOLOGY

**General Geology & Palaeontology
(2008 Pattern) (Paper - II) (41620)**

Time : 3 Hours]

[Max. Marks : 80

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) Answer the following questions : **[16]**

- a) Define Regolith.
- b) Give the types of volcanoes based on continuity of the volcanic activity.
- c) Draw a neat labelled diagram of Gastropod shell.
- d) Define fossil.
- e) Define continental slope and continental shelf.
- f) Define Monomyaria and Dimyaria.
- g) Define Attrition and Abrasion.
- h) List the historical methods for dating of the earth.

Q2) Answer Any Four questions from the following : **[16]**

- a) Differentiate between Regular and Irregular Echinoids.
- b) Describe the various branches of Palaeontology.
- c) Define fossil. Give a list of equipment used in field work.
- d) Describe the various products of volcanoes.
- e) Define Isostasy. Describe the Airy's hypothesis of isostasy.
- f) Define Geology. Describe various branches of Geology.

P.T.O.

Q3) Answer Any Four questions from the following : **[16]**

- a) Define weathering. Describe the various types of chemical weathering.
- b) Describe the various sampling techniques used in collection of fossils.
- c) Describe the sand dune and its type.
- d) Describe the meandering and Ox-bow lake formation.
- e) Draw a neat diagram of various forms of gastropod shells.
- f) Explain the origin of the solar system with the Encounter theory.

Q4) Answer Any Two questions from the following : **[16]**

- a) Explain the evidences of continental drift.
- b) Describe the internal structure of the earth and give the various discontinuities present within crust, mantle and core.
- c) Distinguish between Lamellibranchs and Brachiopods.
- d) Describe variation in apical disc of echinoids.

Q5) Define an earthquake. Explain the terms focus, epicentre and isoseismal line. Add a note on seismograph. **[16]**

OR

- a) Describe the various modes of preservation of fossils. **[8]**
- b) Describe the hard part morphology of trilobite. **[8]**



P214

[4017] - 15

F.Y. B.Sc.

GEOGRAPHY - I

**Gg - 110 : Physical Geography
(2008 Pattern) (Paper - I) (41810)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat diagrams and sketches wherever necessary.*
- 4) *Use of map stencils is allowed.*

Q1) Answer the following questions in two or four sentences :

- a) Crust.
- b) Epicentre of earthquake.
- c) Exfoliation.
- d) Define Physical Geography.
- e) Meander.
- f) Cirque.
- g) Barchan.
- h) Denudation.

Q2) Explain the following in brief (Any Four):

- a) Types of seismic waves.
- b) Effects of earthquakes.
- c) Define rocks and classify them.
- d) Chemical weathering.
- e) Flood plains and levees.
- f) Formation of Loess.

P.T.O.

Q3) Answer the following (Any Four):

- a) Earth's mantle.
- b) Types of folds.
- c) Block Mountain.
- d) Explain land slides.
- e) Explain types of Deltas.
- f) Describe factors affecting mass movement.

Q4) Answer the following (Any Two):

- a) Explain Holme's Convection Theory.
- b) Explain types of metamorphic rocks and give their characteristics.
- c) Landforms associated with wind erosion.
- d) Landforms associated with Glacial deposition.

Q5) Explain wegner's continental Drift Theory in details.

OR

Describe various landforms associated with erosional and depositional work of sea waves.



P215

[4017] - 16

F.Y. B.Sc.

GEOGRAPHY - II

**Gg - 120 : Geography of Atmosphere and Hydrosphere
(41820) (2008 Pattern) (Paper - II)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat diagrams and sketches wherever necessary.*
- 4) *Use of map stencil is allowed.*

Q1) Answer the following questions in two or four sentences :

- a) Give sub-divisions of climatology.
- b) Give examples of low clouds.
- c) What do you mean by front?
- d) Define weather.
- e) What do you mean by low tide?
- f) Give types of waves.
- g) Give examples of totally landlocked sea.
- h) What do you mean by La-Nino?

Q2) Explain the following in brief (Any Four):

- a) Scope of climatology.
- b) Types of temperature inversion.
- c) Horizontal distribution of pressure.
- d) Ocean Deep.
- e) Ria Coast.
- f) Salinity of Indian Ocean.

P.T.O.

Q3) Answer the following (Any Four):

- a) Troposphere.
- b) Relative humidity.
- c) Source region of an air mass.
- d) Salinity of Mediterranean sea.
- e) Effects of ocean currents.
- f) Causes of tides.

Q4) Answer the following (Any Two):

- a) Land and sea breezes.
- b) Any four factors affecting on horizontal distribution of temperature.
- c) Explain structure of Indian Ocean floor.
- d) Explain Equilibrium theory of tides.

Q5) With a neat diagram explain formation of pressure belts and their relation with winds.

OR

Explain nature and scope of Oceanography.



Total No. of Questions : 5]

[Total No. of Pages : 2

P216

[4017]-17

F.Y. B.Sc.

MICROBIOLOGY

**Introduction to Microbiology
(41910) (2008 Pattern) (Paper - I)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat labelled diagrams wherever necessary.*
- 3) *Figures in bracket indicates full marks.*

Q1) Attempt the following :

[16]

- a) Lactose is composed of _____ and _____ .
- b) _____ linkage form backbone of DNA.
 - i) Phosphodiester.
 - ii) Glycosidic.
 - iii) Peptide.
 - iv) di-sulphide.
- c) F.Redi's experiment proved theory of spontaneous generation.
(True/False)
- d) Match the following :

i) Louis Pasteur	1) Surgical Antisepsis
ii) Joseph Lister	2) Vaccination
iii) Robert Koch	3) Phagocytosis
iv) Elie Metchnikoff	4) Germ theory of disease
- e) Define covalent bond.
- f) Bacterial pili are composed of _____ protein.
- g) In 70s ribosome 'S' refers to _____ unit.
- h) TMV contains _____ as genetic material.
 - i) ss RNA.
 - ii) ss DNA.
 - iii) ds RNA.
 - iv) ds DNA.

P.T.O.

Q2) Attempt any four of following : **[16]**

- a) Write a note on carbohydrate functions.
- b) What are metachromatic granules? Give their significance to bacterial cell.
- c) Describe the salient features of life cycle of plasmodium.
- d) Give the distinguishing characters of eubacteria.
- e) Describe the Aristotles notion about spontaneous generation.
- f) Enlist milestone developments in chemotherapy.

Q3) Attempt any four of the following : **[16]**

- a) Describe in brief types of chemical bonds with suitable examples.
- b) Give the comparative account of DNA and RNA.
- c) Enlist the biochemical characters of Staphylococcus.
- d) Draw neat labelled diagram of λ (lambda) phage.
- e) Define prion? Give its clinical significance.
- f) Describe the physiological significance of fermentation.

Q4) Attempt any two of the following : **[16]**

- a) Explain the structure of cell wall of Gram negative bacteria.
- b) Write general characters of TMV and draw neat labelled diagram representing its Life Cycle.
- c) Give general characters and economic importance of algae.
- d) What are protozoa? Enlist various classes of protozoa with suitable example.

Q5) Attempt any one of the following : **[16]**

- a) What is germ theory of disease? Describe R.Koch's and River's postulates.
- b) Describe the structure, chemical composition and function of flagella in bacteria.



P218

[4017] - 19
F.Y. B.Sc.
PSYCHOLOGY
General Psychology
(42010) (Paper - I) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw the figures and diagrams wherever necessary.*
- 3) *All questions carry equal marks.*

Q1) Attempt all 8 questions in one or two sentences.

[16]

- a) Define Psychology.
- b) What is emotion?
- c) Enumerate biological motives.
- d) What is biopsychosocial perspective?
- e) Define personality.
- f) What is self concept?
- g) What is memory?
- h) What is the meaning of Mnemonics?

Q2) Answer the following questions in 6/8 sentences (Any Four):

[16]

- a) Enlist the various types of psychological professions.
- b) Explain the instinct approach of motivation.
- c) Describe the role of reinforcement in learning.
- d) Discuss the laws of thorndike in brief.
- e) What is problem solving and its stages.
- f) Explain MA & CA concepts of intelligence quotient.

P.T.O.

Q3) Attempt the following questions in 6/8 sentences (Any Four): **[16]**

- a) Explain the observation method of data collection.
- b) What is operant conditioning.
- c) Explain modelling.
- d) Discuss types of long term memory.
- e) Illustrate 'wechsler's test of intelligence'.
- f) Describe Binet's test of intelligence for children.

Q4) Answer any two of the following questions : **[16]**

- a) Describe any two historical perspectives of psychology.
- b) How to be happy in the life.
- c) Explain the Big five model of personality.
- d) Explain any two memory improvement techniques.

Q5) Explain the structure and function of neuron. **[16]**

OR

What is sensation? Describe the structure and function of human eye.



P219

[4017] - 20

F.Y. B.Sc.

PSYCHOLOGY

**Experimental Psychology & Psychological Testing
(2008 Pattern) (Paper - II) (42020)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw the figures and diagrams wherever necessary.*
- 3) *All questions carry equal marks.*

Q1) Attempt all 8 questions in 1/2 sentences :

[16]

- a) What is randomization?
- b) What is difference between continuous and discrete variable.
- c) Enlist the law of thorndike.
- d) Give two names of Gestalt Psychologists.
- e) Define psychological test.
- f) Define intelligence.
- g) What is spm.
- h) Define chronback alpha.

Q2) Answer the following questions in 6/8 sentences (Any Four) :

[16]

- a) Explain the term variable.
- b) Discuss the term creativity.
- c) Discuss the term validity.
- d) Explain test-retest reliability.
- e) Illustrate sentence completion test.
- f) Enlist the interest tests.

P.T.O.

Q3) Answer the following questions in 6/8 sentences (Any Four) : **[16]**

- a) Enlist the types of psychological tests.
- b) Explain reliability.
- c) Discuss validity.
- d) Illustrate the GATB.
- e) Explain TAT in brief.
- f) What is importance of personality test.

Q4) Answer any two of the following : **[16]**

- a) What is experiment? State the importance of control.
- b) Discuss the trial and error in problem solving.
- c) Explain the social and ethical issues in testing.
- d) Illustrate Gardners theory of intelligence.

Q5) What is DL? Find out the DL method of constant stimuli with hypothetical Data. **[16]**

OR

Define RT. Discuss its determinants.



P220**[4017] - 21****F.Y. B.Sc.****ELECTRONIC-SCIENCE****EL1 - T1 - Principles of Analog Electronics****(2008 Pattern) (Paper - I) (42210)***Time : 3 Hours]**[Max. Marks : 80**Instructions to the candidates:*

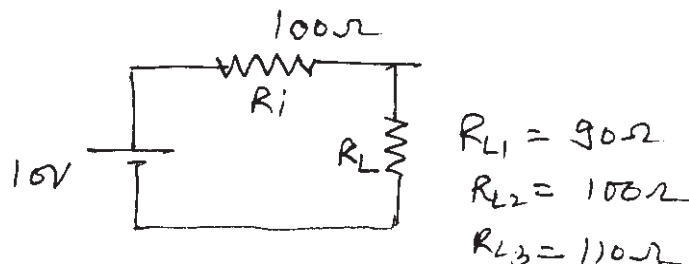
- 1) *All questions are compulsory.*
- 2) *Draw neat labelled diagrams wherever necessary.*
- 3) *Use of log tables calculators is allowed.*
- 4) *Figures to the right indicate full marks.*

Q1) Answer the following questions in brief :**[16]**

- a) List important specifications of fixed resistors.
- b) Define amplitude and period of sine wave signal.
- c) State Thevenin's theorem of electrical network.
- d) Draw transistor equivalent circuit of SCR.
- e) Draw circuit of Zener as voltage regulator.
- f) Define α & β of transistor.
- g) What is step down transformer? Draw circuit symbol.
- h) Draw circuit diagram of inverting amplifier using opamp.

Q2) Answer any four of the following :**[16]**

- a) What is capacitor. List different types of fixed capacitors. Explain in brief paper capacitor.
- b) Explain the concept of ideal voltage and ideal current source.
- c) Describe construction and working of PNP Transistor.
- d) Explain working & I.V characteristics of zener diode.
- e) Draw equivalent circuit of UJT. Explain its working principle.
- f) Verify maximum power transfer theorem for the following circuit.

**P.T.O.**

Q3) Attempt any four of the following : **[16]**

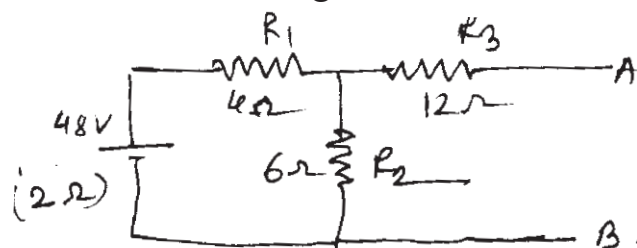
- a) Define inductance. List different types of inductors. Explain in brief air core inductor.
- b) Write a short note on LED & photodiode.
- c) Explain working of bridge rectifier with proper circuit & waveforms.
- d) What is SCR? Give its construction and operating principle in detail.
- e) Explain the rules to find Thevenin's equivalent circuit.
- f) Draw RC circuit apply square wave input explain what will be the output across R.

Q4) Attempt any two of the following : **[16]**

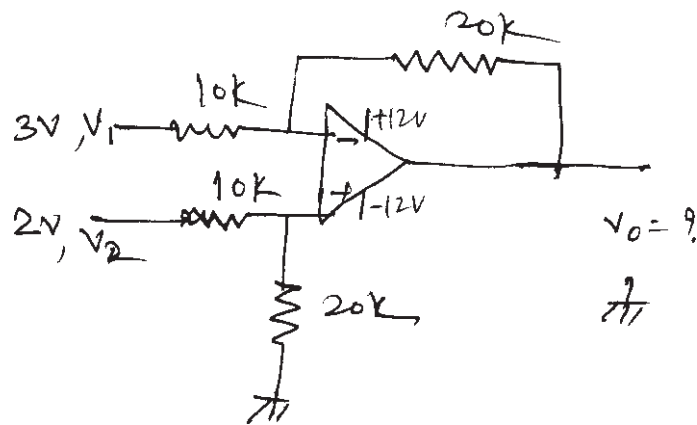
- a)
 - i) Draw LCR series circuit Draw its frequency response curve. Derive formula for its resonant frequency.
 - ii) Explain construction & working of depletion type MOSFET.
- b)
 - i) Explain working of NPN transistor as switch.
 - ii) With the help of proper circuit, explain the action of three input summing amplifier using opamp.
- c)
 - i) What is biased clipper? Explain with proper circuit biased positive clipper.
 - ii) Explain construction & working of switching diode.

Q5) Attempt any two of the following : **[16]**

- a)
 - i) What is voltage doubler. Explain full wave voltage doubler with proper circuit.
 - ii) Draw I.V characteristics of BJT in CE configuration show its different operating regions.
- b)
 - i) The arms of π network has $R_a = 60 \Omega$, $R_b = 40 \Omega$, $R_c = 20 \Omega$ convert it into T network.
 - ii) Nortonize the following circuit.



- c) i) In common base connection $I_c = 0.98 \text{ mA}$, $I_B = 0.04 \text{ mA}$ find α & β .
- ii) Find the output voltage of the following circuit.



P221**[4017] - 22****F.Y. B.Sc.****ELECTRONIC SCIENCE****EL1 - T2 : Principles of Digital Electronics****(2008 Pattern) (Paper - II) (42220)***Time : 3 Hours]**[Max. Marks : 80**Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Use Calculator and logtable is allowed.*
- 4) *Figures to the right indicate full marks.*

Q1) Answer the following questions in brief :**[16]**

- a) Verify the following Boolean laws
 - i) $A \cdot A = A$
 - ii) $A + \bar{A} = 1$
- b) What is gray code, write gray code for decimal 14.
- c) Draw the logic circuit using EX-OR gate for,
 - i) as one bit comparator
 - ii) as an inverter
- d) What is clock? what are various method of triggering a flip-flop?
- e) Define the following term associated with memory
 - i) address line
 - ii) data line
- f) Draw two input NAND gate construct its truth table.
- g) What is unipolar and bipolar logic families?
- h) Differentiate between demultiplexer and decoder.

Q2) Answer any four of the following :**[16]**

- a) State and prove Demorgan's theorem.
- b) Convert $(10010110)_2$ into octal and $(A7)_{16} = (---)_{10}$.
- c) Draw the logic circuit of 4-bit universal shift register. Explain how it is used as PIPO shift register
- d) Perform following subtraction using 2's complement method
 - i) $72 - 36$
 - ii) $48 - 12$
- e) With the neat diagram explain working of parallel 4-bit binary subtractor.
- f) Draw the circuit of mod-10 counter using flip-flops Draw its timing diagram.

P.T.O.

Q3) Answer any four of the following : **[16]**

- a) Convert the following
 - i) $(2003)_{10} = (\text{----})_{16}$ ii) $(0.8)_{10} = (\text{-----})_2$
- b) How EX-OR gate can be used as parity bit generator.
- c) Describe 3-bit updown counter with neat diagram.
- d) Give general classification of semiconductor memory explain one of them in detail.
- e) What is Half adder? Write its truth table and explain its operation.
- f) Explain 1:4 demultiplexer with proper circuit diagram.

Q4) Answer any four of the following : **[16]**

- a) Draw the logic circuit of 3-input OR gate using diode. Explain its working.
- b) Simplify the following boolean equation and draw logic circuit of simplified output $Y = A B \bar{C} + A \bar{B} \bar{C} + A \bar{B} C + A B C + B C$.
- c) With neat logic diagram explain octal to binary encoder.
- d) Differentiate between static RAM and dynamic RAM.
- e) Draw the circuit of 2 input CMOS NOR gate. Write its truth table.
- f) What is seven segment display a Draw different types of seven segment display available.

Q5) Answer any four of the following : **[16]**

- a) Simplify the following expression using k-map and draw its simplified logic diagram.
$$Y = \bar{A} B \bar{C} D + A \bar{B} \bar{C} D + A B \bar{C} D + \bar{A} \bar{B} C D + \bar{A} \bar{B} + \bar{C} \bar{D} + \bar{A} \bar{B} C \bar{D} + \bar{A} \bar{B} \bar{C} D$$
- b) Explain 2:1 multiplexer with proper logic circuit.
- c) What is Asynchronous counter? List advantages and disadvantages over synchronous counter.
- d) Explain SISO shift register with neat diagram.
- e) List the performance characteristics of digital integrated circuit. Explain Noise immunity.
- f) Draw clocked RS flip-flop. Write its truth table and explain its operation.



Total No. of Questions : 4]

[Total No. of Pages : 2

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[4017] - 23

F.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 1 : War and Warfare

(2008 Pattern) (Paper - I) (42310)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Answer in 20 words (Any Ten):

[20]

- a) Define 'Warfare'.
- b) Define 'Propaganda'.
- c) What is meant by 'Radar'?
- d) Define 'Security'.
- e) What is 'Space Defence'?
- f) Define 'Terrorism'.
- g) What is 'Tactics'?
- h) Define 'Warship'.
- i) What is 'Just War'?
- j) What is 'Cartographic Change'?
- k) Define 'Pre-emptive War'.
- l) What is 'Revolutionary War'?
- m) Who was 'Mao Tse Tung'?

Q2) Answer in 50 words (Any Two):

[10]

- a) Write the scope of war.
- b) Write theory of war.
- c) Write a note on 'Brain Washing'.
- d) Write the importance of 'Psychological Warfare'.

P.T.O.

Q3) Answer in 150 words (Any Two): **[20]**

- a) Explain about nuclear strategy.
- b) Explain the types of Psychological Warfare.
- c) Explain economic aspects of defence.
- d) Why is it difficult to control LIC in democracy?

Q4) Answer in 300 words (Any Two): **[30]**

- a) Discuss tactics and methods of Psychological Warfare.
- b) Discuss the methods of economic warfare.
- c) Write an essay on Chemical and Biological Warfare.
- d) Discuss the perspective and dimension of national security and warfare.



Total No. of Questions : 4]

[Total No. of Pages : 2

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[4017] - 24

F.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 2 : Defence Mechanism and Military Career in India

(Paper - II) (42320) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Answer in twenty words each (Any Ten):

[20]

- a) State the objectives of Civil Defence.
- b) Write the objectives of C.R.P.F.
- c) Write any two functions of Indian Air Force.
- d) Write any two roles of RAW.
- e) State the meaning of integrated perspective plan in Defence.
- f) State any two secondary role of Indian army.
- g) Write the meaning of changing nature of warfare.
- h) Define maritime Strategy of Indian Navy.
- i) State any two objectives of India's defence policy.
- j) What do you mean by strategic control?
- k) Define sea power.
- l) Explain the meaning of Air power.
- m) State any two functions of Territorial Army.

Q2) Answer in 50 words (Any Two):

[10]

- a) Discuss organization of Coast Guard.
- b) Explain role of administrative services in Peace.
- c) Discuss functions of National Security Council in India.
- d) Write about the characteristics of sea power.

P.T.O.

Q3) Answer in 150 words (Any Two):

[20]

- a) Explain career options in Intelligence Organization in India.
- b) Discuss career options in Para military forces.
- c) Explain role of Civil Defence in disaster management.
- d) Explain organization of Indian Army.

Q4) Answer in 300 words (Any Two):

[30]

- a) Describe the Higher Defence Organization in India.
- b) Explain characteristics, Role and Limitations of Infantry.
- c) Describe various career options in Indian Armed Forces.
- d) Write role of Indian Navy in national Economy.



Total No. of Questions : 4]

[Total No. of Pages : 2

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F.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS. No. - III : Evolution of Defence Science and Technology

(2008 Pattern) (Paper - III) (42330)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Answer in 20 words each (Any Ten):

[20]

- a) What do you mean by Technology?
- b) State the meaning of Catapult.
- c) Write the long form of I.R.B.M.
- d) Who & when the Blitzkrieg tactics it was introduced?
- e) State the basic function of RADAR.
- f) When & by whom the Nuclear Weapon it was introduced?
- g) What do you understand by L.I.C?
- h) Who invented the Aircraft?
- i) When & by whom U - Boat it was introduced?
- j) Who prepared the design of Tank firstly?
- k) Why "Gustavas Adolphus" called a father of Modern Army?
- l) Write any two sources of conventional energy.
- m) State the meaning of "RMA".

Q2) Answer in 50 words (Any Two):

[10]

- a) Write in brief beginning of Modern War.
- b) Explain in short the concept of "Strategic Minerals".
- c) Discuss in brief the concept of "Dual Technology".
- d) Write in brief the impact of Industrial revolution on Contemporary Society.

P.T.O.

Q3) Answer in 150 words (Any Two): [20]

- a) Explain the arrival of tanks & its impact on contemporary warfare.
- b) How you would like to establish the relationship between Energy Security and National Security.
- c) Write a note on various types of Missiles.
- d) Highlight on new emerging Military technologies.

Q4) Answer in 300 words (Any Two): [30]

- a) Analyse the impact of science & technology on contemporary warfare.
- b) Explain the nature of L.I.C. in India's North-East Region.
- c) Highlight on the causes of emergence of General Staff.
- d) Discuss the role of "Air Power" during World War - I & II



P367**[4017]-14****F.Y. B.Sc.****STATISTICS/STATISTICAL TECHNIQUES**
Discrete Probability and Probability Distributions
(2008 Pattern) (Paper - II)*Time : 3 Hours]**[Max. Marks : 80**Instructions to the candidates:*

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

Q1) a) Choose correct alternative for the following : [4 × 1 = 4]

i) If A and B are two independent events defined on Ω , such that $P(A) = 0.4$, $P(B) = 0.5$ then $P(A \cap B)$ is equal to :

- A) 0.2 B) 0.1
C) -0.1 D) 0.9

ii) If $\text{Var}(X) = 4$, then $\text{Var}(2x + 3)$ is :

- A) 11 B) 16
C) 8 D) 5

iii) Let $X \rightarrow B(n, p)$ then

- A) Mean > variance. B) Mean < variance.
C) Mean = 2 variance. D) Mean = variance

iv) If $A \subset B$, then $P(A/B)$ is equal to :

- A) $P(A)$ B) $\frac{P(A)}{P(B)}$
C) $\frac{P(B)}{P(A)}$ D) 1.

b) State whether the following statements are true or false : [4 × 1 = 4]

- i) Expected value of a constant is zero.
- ii) Conditional probability does not satisfies axioms of probability.
- iii) Hypergeometric distribution has three parameters.
- iv) Variance of random variable X is always positive.

- c) Define sample space and give one example of it. [2]
- d) State additive property of Binomial distribution. [2]
- e) Define independence of two events. [2]
- f) Define poisson distribution with parameter m . [2]

Q2) Attempt any four of the following : [4 × 4 = 16]

- a) Given $P(A) = 0.3$, $P(B) = 0.4$, $P(A \cup B) = 0.9$

Find :

- i) $P(A \cap B)$
- ii) $P(A \cap B')$
- iii) $P(A' \cap B)$
- iv) $P(A'/B)$

- b) If X is a discrete random variable with p.m.f.

$$P(X = x) = kx, x = 1, 2, 3, 4, 5$$

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

Find i) K

- ii) $P(X \leq 3)$
- iii) $P(2 < X \leq 5)$
- iv) $P(X > 3 / X > 4)$

- c) If A and B are any two events defined on Ω , then prove that,
 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

- d) State and prove Baye's theorem.

- e) Define cumulative distribution function (c.d.f.) and state any four properties of it.

- f) Let X be discrete random variable with following probability distribution.

X	0	1	2	3
$P(X = x)$	0.1	0.3	0.4	0.2

Find:

- i) $E(x)$
- ii) $\text{Var}(X)$

Q3) Attempt any four of the following : [4 × 4 = 16]

- a) State axioms of probability; Let A and B be two events defined on Ω , such that $A \subset B$, then prove that $P(A) \leq P(B)$.

- b) Define :
- i) Partition of sample space.
 - ii) Mutual independence of three events.
- c) Let A, B, C be any three events defined on Ω , Write expressions for the following events.
- i) At least one occurs.
 - ii) All the three occurs.
 - iii) Exactly one occurs.
 - iv) None occurs.
- d) A lot of 15 television sets includes 3 with white cords. A random sample of 5 sets is drawn without replacement. Let X be the number of sets with white cords. Obtain the probability distribution of X.
- e) A card is drawn at random from a well shuffled pack of 52 playing cards.
- Let A, B and C be the events as below :
- A: The card is a club
 B: The card is a spade.
 C: The card is an ace.
 Find : $P(A \cup B \cup C)$.
- f) State and prove recurrence relation between probabilities for Binomial distribution with parameters n and p .

Q4) Attempt any two of the following : **[2 × 8 = 16]**

- a) The Probability distribution of r.v.x is given below :

X	0	1	2	3
P(X = x)	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{6}$

Compute :

- i) first three row moments of x .
 - ii) first three central moments of x .
- b) Let $X \rightarrow B(n, p)$ obtain $E(X)$ and $\text{Var}(X)$
- c) i) Show that all raw moments of Bernoulli distribution are equal to 'p'.
- ii) A discrete r.v.x has the following p.m.f.

$$P(X = x) = \frac{1}{n}, x = 1, 2, 3, \dots, n$$

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

Find :

- 1) $E(X)$
- 2) $E(X^2)$
- 3) $\text{Var}(X)$

d) Let $X \rightarrow B(n_1, p)$; $Y \rightarrow B(n_2, p)$ if X and Y are independent.

Find the conditional probability distribution of X/Y $X + Y = n$

Q5) Attempt any two of the following : **[2 × 8 = 16]**

a) Joint p.m.f. of (X, Y) is given below :

$$P(x, y) = \frac{2x + 5y}{42}; \quad \begin{matrix} x=1,2 \\ y=1,2 \end{matrix}$$

=0, otherwise.

Find:

- i) Marginal probability distribution of X and Y .
 - ii) Conditional probability distribution of $X/Y = 1$
 - iii) Conditional probability distribution of $Y/X = 1$
 - iv) $E(X/Y = 1)$ and $E(Y/X = 1)$.
- b) i) Define Hypergeometric distribution. **[2]**
- ii) Let $X \rightarrow B(n, p)$; if $E(X) = 6$, $\text{Var}(X) = 4.2$ find n and p . **[6]**
Also find $P(X = 0)$ and $P(X > 0)$
- c) Show that Poisson distribution is a limiting case of Binomial distribution under certain conditions to be stated.
- d) The joint Probability distribution of (X, Y) is given below :

	Y	0	1	2
X				
-1		1/6	0	1/12
1		1/4	1/3	1/6

Find :

- i) $E(X)$ and $E(Y)$
- ii) $V(X)$ and $V(Y)$
- iii) $\text{COV}(X, Y)$
- iv) Correlation coefficient between X and Y .

