[4317]-19

F.Y.B.Sc.

PSYCHOLOGY

(Paper - I) General Psychology

(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 Sensation.

    b)   Define Perception.

    c)   Define Motivation.

    d)   Define emotion.

    e)   Define learning.

    f)   Define operant conditioning.

    g)   State the formula of I.Q.

    h)   State the two factors of Spearman's theory.

Q2) Answer the following questions in 6/8 sentences. (any - 4) **[16]**

    a)   Describe the method of case study.

    b)   Discuss the perceptual illusion.

    c)   Describe the need hierarchy theory of Maslow.

    d)   Describe the 16 personality factor Inventory.

    e)   Explain the concept of I.Q.

    f)   Explain the types of mental retardation.

Q3) Attempt the following questions in 6/8 sentences. (any - 4)   **[16]**

   a) Explain the method of observation.

   b) Explain the sources of frustration.

   c) Describe the physiology of emotion.

   d) Describe the big - five model theory.

   e) State Thorndike's laws of learning.

   f) Describe the Weschler's Intelligence scale for children.

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

   a) Explain the modern perspectives in psychology.

   b) Explain Gestalt principles of perception.

   c) Discuss the projective techniques in brief.

   d) Describe the concepts of classical conditioning.

Q5) Describe the structure and function of human brain.   **[16]**

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

Define forgetting. Explain the causes and theories of forgetting.

<div align="center">♦♦♦♦</div>

[4317]-20

F.Y.B.Sc.

PSYCHOLOGY

Experimental Psychology and Psychological Testing

(Paper - II) (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 questions in one or two sentences.   **[16]**

    a)   Define experiment.

    b)   What is simple reaction time.

    c)   Define psychological test.

    d)   State the fulform of T.A.T.

    e)   Define personality.

    f)   State the characteristics of good Psychological Test.

    g)   State the example of reaction time in ourlife.

    h)   Define independent variable.

Q2) Answer the following questions in 6/8 sentences (any 4)   **[16]**

    a)   Illustrate Rorschach Ink - Blot test.

    b)   Explain self report inventory.

    c)   Describe the stages in problem solving.

    d)   Explain internal consistency reliability.

    e)   Explain trial and error in problem solving.

    f)   Describe control techniques in experimentation.

P.T.O.

Q3) Answer the following questions in 6/8 sentences (any 4)   **[16]**

    a) Discuss the continuous and discrete variable.

    b) Explain brain storming technique.

    c) Describe the uses of psychological tests.

    d) Explain test - retest reliability.

    e) Illustrate sentence completion test.

    f) Explain concepts in IQ.

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

    a) Define variable with its types.

    b) Explain basic concepts of psychophysics.

    c) Describe types of validity.

    d) Explain the types of psychological tests.

Q5) Discuss determinants of reaction time.   **[16]**

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

Define aptitude. Explain differential aptitude test (DAT)

<div align="center">♦♦♦♦</div>

[4317]-21

F.Y. B.Sc.

ELECTRONIC SCIENCE

EL1 - T1 - Principles of Analog Electronics

(2008 Pattern) (Paper - I)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to the candidates:

   1)   *All questions are compulsory.*

   2)   *Draw neat labelled diagrams and symbols wherever necessary.*

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

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

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

   a)   Define :

      i)   Self inductance

      ii)   Mutual inductance

   b)   Draw circuit symbols of :

      i)   LDR

      ii)   Preset

   c)   State two important specifications for capacitor?

   d)   Define ideal voltage and ideal current sources?

   e)   State Thevenin's network theorem.

   f)   Draw I - V characteristics of :

      i)   Zener diode

      ii)   Switching diode

   g)   Define :

      i)   Ripple factor

      ii)   Peak inverse voltage

   h)   State any two applications of OPAMP.

Q2) Answer <u>any Four</u> of the following.   **[16]**

   a)   Write two important specifications of :

      i)   Switch &

      ii)   Fuse

   b)   Which are different types of signals used in Electronics? What are parameters of symmetric square waves?

c) Explain series LCR circuit? Obtain expression for resonance frequency F_r?

d) What is an opto coupler explain its working?

e) Explain in brief full wave voltage doubler circuit?

f) The arms of 'T' network has $R_1 = 4$ ohm, $R_2 = 5$ ohm, and $R_3 = 6$ ohm convert it into equivalent 'π' network.

Q3) Answer the following questions. (any Four) **[16]**

a) Explain in brief :

   i) Types of PCBS &

   ii) A standard cell?

b) Explain frequency response of low pass RC passive filter.

c) Draw an output I - V characteristics of BJT in CE mode.

   Define :

   i) β current gain of BJT &

   ii) Dynamic resistance.

d) Write comparison between photodiode and LED.

e) Draw block diagram of an amplifier? Define voltage gain and current gain.

f) Verify the maximum power transfer theorem for the adjoining circuit.
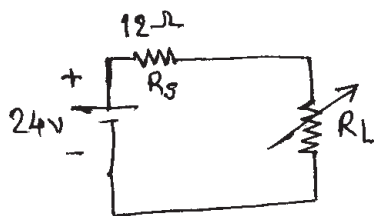

$R_{L_1} = 12$ ohm, $R_{L_2} = 20$ ohm and $R_{L_3} = 48$ ohm

Q4) Answer <u>any Four</u> of the following : **[16]**

a) Explain in brief working of RC differentiator circuit?

b) Draw diagram of :

   i) General purpose electromagnetic relay and

   ii) Co - axial cable.

c) Explain construction of P - channel JFET?

d) Explain working of half wave rectifier circuit and draw corresponding input and output waveforms?

e)   Compare performance of CB and CE mode BJT?

f)   Obtain the equivalent circuit using Norton's theorem for the following networks.
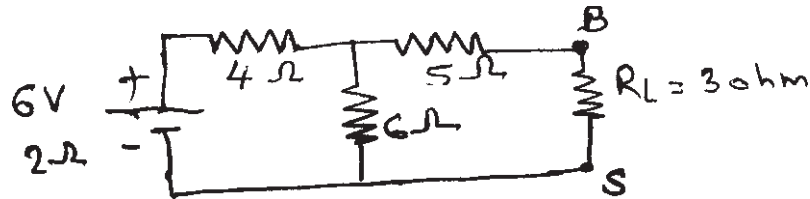
Q5) Answer <u>any Four</u> of the following.   **[16]**

a)   Draw construction, I - V characteristics and explain working of SCR in brief?

b)   What are different methods of biasing a transistor? Which method is prominently used & why?

c)   State :

i)   Kirchhoff's current and voltage laws?

ii)   Super position theorem.

d)   Explain use of OPAMP as inverting amplifier and obtain an expression for its voltage gain?

e)   Explain with the help of an equivalent circuit working of UJT? Draw its I-V characteristics?

f)   Obtain an expression for voltage across capacitor in RC circuit when a step signal is applied at its input?

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[4317]-22

F.Y. B.Sc.
ELECTRONIC SCIENCE
EL1 - T2 : Principles of Digital Electronics
(2008 Pattern) (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)   *Use calculator and log table is allowed.*

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

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

    a)   What is the radix used in the case of binary and hexadecimal?

    b)   Why NAND and NOR gates are called as universal gate?

    c)   Draw logic diagram for logic equation $Y = (A + B).C$

    d)   Subtract (1001) from (1100) using the 1's complement method.

    e)   Define :

        i)   Combinational logic circuit.

        ii)   Sequential logic circuit.

    f)   Draw logic diagram and write truth table for T - flip - flop.

    g)   Define the terms noise immunity and noise margin.

    h)   State the basic principle of operation of static RAM cell and Dynamic RAM cell.

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

    a)   Convert the following.

        i) $(101110)_2 = (......)_{Gray}$

        ii) $(0110)_{Gray} = (........)_2$

    b)   Draw logic diagram of two input OR gate using diode. Explain its action.

    c)   Simplify following expression using K - Map.

$$Y = \overline{A}\overline{B}\overline{C}D + AB\overline{C}D + ABC\overline{D} + A\overline{B}C\overline{D}$$

    d)   With the neat diagram explain working of parallel 4 - bit binary subtractor.

    e)   Draw neat diagram of key - board encoder. Explain its operation with truth table.

    f)   Explain working of clocked R - S flip - flop with logic diagram and truth table.

P.T.O.

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

a) Convert the following expression into their standard SoP forms.

   i) $Y = AB + A\overline{C} + BC$

   ii) $Y = A + B + C + ABC$

b) Draw full adder circuit using half adders. Write the logic expression for sum and carry out. Explain with truth table.

c) Write a note on priority encoder.

d) Draw the circuit, truth table and waveforms of 4 - bit binary counter.

e) Draw the circuit of CMOS NAND gate, explain its action.

f) Describe the classification of memory based on technology, function & uses.

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

a) State and prove De Morgan's theorem.

b) What do you mean by seven - segment display? Which are the different types of seven segment display?

c) State the modes of operation of shift registers with block diagram.

d) Explain the action of NOR gate using RTL logic.

e) List the performance characteristics of digital integrated circuits. Explain power dissipation.

f) Explain the structural organization of memory chip.

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

a) i)   What is a gray code?

   ii)   Draw AND gate circuit with transistor, write truth table for it.

b) i)   What is the function of strobe?

   ii)   Draw the circuit to obtain 4 to 1 multiplexer using 2 to 1 multiplexer.

c) i)   State the different applications of shift register.

   ii)   What is clock? What are various method of triggering a flip -flop?

d) i)   What is synchronous counter? Find out total propagation delay of 4 - bit synchronous counter, if propagation delay of a flip - flop is 20 nsec.

   ii)   List the function of following IC's IC 7495 and IC 7490.

e) i)   What is meant by open collector gates? State its advantages.

   ii)   Describe the term saturated and non - saturated logic families.

f) i)   State the different types of logic families.

   ii)   State the prominent manufacturers of integrated circuit.

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[4317]-23

F.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 1 : War and Warfare

(2008 Pattern) (Paper - I)

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 'Defence'.

   b)   Define 'Security'.

   c) What is meant by 'Degree of Nuclear Risk'?

   d)   Define 'Chemical warfare'?

   e)   What is 'Psychological warfare'?

   f)   What is meant by 'Order of battle'?

   g)   Define 'Tactics'.

   h)   What is meant by 'Second strike capability'?

   i)   Define 'Insurgency'.

   j)   Define 'Terrorism'.

   k)   Define 'Naxalism'.

   l)   Define 'National Power'.

   m) Who was 'Sun Tzu'?

Q2) Answer in 50 words (Any two) :   **[10]**

   a)   Write the concept and meaning of war.

   b)   Write about causes of war.

   c)   Introduce Brain Washing.

   d)   Write about the nature of modern war.

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

a) Explain about Theory of war.

b) Discuss Nuclear strategy.

c) Explain the methods of Economic warfare.

d) Write the importance of psychological warfare.

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

a) Discuss the principles of Guerilla war.

b) Explain the causes of LIC.

c) Write an essay on Chemical and Biological warfare.

d) Why information warfare is significant in this age of internet? Explain.

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[4317] - 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 calculators is allowed.*
4) *Symbols have their usual meanings.*
5) *Graph papers will be supplied on request.*

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

[4 x 1 = 4]

a) Choose the correct alternative for the following:

i) The type of sampling approach where each person in the sampling frame has an equal chance of being selected is best described as:

1) Systematic sampling.

2) Stratified random sampling.

3) Simple random sampling.

4) Cluster Sampling.

ii) Box plot helps to judge the

1) Spread.

2) Symmetry.

3) Central value.

4) All the above.

iii) Which of the following is not a central value?

1) Arithmetic mean.

2) Median.

3) Mode.

4) Standard Deviation.

iv) Karl Pearson's coefficient of correlation lies between.
   1) 0 to 1.
   2) −1 to 1.
   3) 0 to ∞
   4) −∞ to ∞

b) State whether the following statements are true or false: **[4 x 1 = 4]**
   i) Histogram cannot be drawn for a frequency distribution having open end classes.
   ii) Arithmetic mean can be determined graphically.
   iii) The first central moment is zero.
   iv) For a symmetric distribution the quartiles are equispaced.

c) Define attribute and variable. **[2]**

d) For two attributes A and B if (A) = 100 (B) = 150 (AB) = 60 and N = 500, find (αB). **[2]**

e) Calculate arithmetic mean for a group of 10 observations if $\sum (x_i - 5) = 20$. **[2]**

f) Explain positive correlation with a suitable example. **[2]**

Q2) Attempt <u>any four</u> of the following: **[4 x 4 = 16]**

a) Explain the following terms:
   i) Class limits.
   ii) Class width.
   iii) Class frequency.
   iv) Open end class.

b) Explain systematic sampling with illustration.

c) Suppose $\{(x_i, f_i) i = 1, 2, 3.....k\}$ is a frequency distribution. Show that arithmetic mean does not change if each frequency is doubled.

d) The daily expenditure of 120 families is given below:

Expenditure	100-120	120-140	140-160	160-180	180-200
No. of families	12	-	38	-	14

If the mode of the distribution is 153, find the missing frequencies.

e) Prove that the sum of squared deviation is least when taken from the arithmetic mean.

f)   Explain the concept of skewness. Draw the sketch of a frequency distribution and show the positions of the mean, median and mode when the distribution is

   i)   Symmetric.

   ii) Positively skewed.

Q3) Attempt <u>any four</u> of the following: **[4 × 4 = 16]**

   a)   Define quartile deviation and standard deviation. State the formula for each in case of ungrouped (raw) data and grouped frequency distribution.

   b)   The range, arithmetic mean and standard deviation of a group of 10 observations is 20,62 and 10 respectively. If each observation is decreased by 5, find the value of range and the coefficient of variation for the changed data.

   c)   Describe scatter diagram and explain its use to study correlation.

   d)   Define raw and central moments of a frequency distribution. Express the 4th central moment in terms of the first four raw moments.

   e)   Compute Fisher's price index number for the year 1995 considering year 1990 as the base year for the following data:

Commodity	Quantity		Price	
	1990	1995	1990	1995
A	15	12	15	22
B	14	4	20	27
C	10	8	4	7

   f)   Define median and state any two demerits of median as a measure of central tendency.

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

   a)   i)   What is meant by association of two attributes? How is it measured?

        ii) In a report of consumer preference of two varieties of perfumes A and B, it was given that out of 500 persons surveyed 410 preferred variety A, 380 preferred variety B and 270 persons liked both. Are the data consistent?

   b)   i)   For a bivariate data the regression equations are given by 3X-Y-5 = 0 and 4X-3Y = 0. Find the arithmetic means of X and Y. Also find the correlation coefficient between X and Y.

        ii) Define Spearman's rank correlation coefficient assuming no ties and derive an expression for it.

[4317]-13   **3**

c) Two groups with n_1 and n_2 observations have the arithmetic means $\bar{X}_1$ and $\bar{X}_2$ the standard deviations σ_1 and σ_2 respectively. Derive formula for combined standard deviation in each of the following cases:

i) $\bar{X}_1 = \bar{X}_2$.

ii) $n_1 = n_2$.

iii) $n_1 = n_2$ and $\bar{X}_1 = \bar{X}_2$.

iv) $n_1 = n_2$, $\bar{X}_1 = \bar{X}_2$ and $\sigma_1 = \sigma_2$.

d) i) Write a note on kurtosis.

ii) For a symmetric distribution, with usual notation prove that,

$$\frac{\mu 3'}{\mu 1'} = 3\mu 2 + (\mu 1)^2.$$

Q5) Attempt <u>any two</u> of the following: **[2 x 8 = 16]**

a) i) Define Index Numbers and state its uses.

ii) Weight in mg of 25 residuals are given below:

50,46,31,49,33,42,55,37,36,35,65,57,27,37,42,33,51,46,31,37,51,56,51,43,48,
Construct a stem and leaf chart.

b) For a given bivariate data $(x_i, y_i), i=1,2,...,n$, derive the expression for the line of regression of Y on X.

c) i) Given that $r = 0.3$, $\sum(X-\bar{X})(Y-\bar{Y}) = 108$, $\sigma_y = 3$ and $\sum(X-\bar{X})^2 = 400$. Find number of pairs of observations.

ii) With usual notation prove that, $(byx + bxy)/2 \geq r$ if $r > 0$.

d) i) Explain the procedure of fitting the curve $y = ab^x$ for a bivariate data $(x_i, y_i), i=1,2....n$.

ii) Find quartile deviation if Bowley's coefficient of skewness is –0.36, median = 16.5 and Q1 = 13.8.

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[4317]-16

F.Y.B.Sc.

GEOGRAPHY - II

Gg - 120 : Geography of Atmosphere and Hydrosphere

(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)   What is insolation?

   b)   Give examples of high clouds.

   c)   What is inversion of temperature?

   d)   Enlist different greenhouse gases.

   e)   What is neap tide?

   f)   Define salinity.

   g)   What is Abyssal Plain?

   h)   What is a lagoon?

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

   a)   Nature of climatology.

   b)   Types of Lapse rate.

   c)   Relative Humidity.

   d)   Nature of Oceanography.

   e)   Fiord coast

   f)   Salinity of Lakes

Q3) Answer the following (Any Four) :

a) Characteristics of westerlies

b) Types of airmasses

c) Mid - latitude cyclones

d) Emerged coast

e) Causes of salinity

f) Continental shelf.

Q4) Answer the following (Any Two) :

a) Composition of atmosphere.

b) South west and North East Monsoon winds.

c) Why is oceanographic study gaining importance in modern times.

d) Relief of Indian Ocean.

Q5) Explain factors affecting horizontal distribution of temperature.

OR

With the help of a neat diagram, explain the currents in pacific ocean.

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[4317]-17

F.Y.B.Sc.

MICROBIOLOGY

Introduction to Microbiology

(Paper - I) (2008 Pattern)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to candidates:

   1)   *All questions are compulsory.*

   2)   *Draw neat labelled diagrams wherever necessary.*

   3)   *Figures to right indicate full marks.*

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

   a) Write two examples of capsulated bacteria.

   b) Match the following and rewrite

      i)   Poliovirus   –   ds DNA

      ii)   λ phage   –   ss RNA

          [lambda phage]   –   ds RNA

   c) Name two bacteria containing sulphur granules.

   d) What are lipids made up of?

   e) Which is the major characteristic of algae?

   f) State True or False :-

      i)   F pilus helps in conjugation.

      ii)   Bacterial ribosomes are 70 S type.

   g) Enlist components of an atom.

   h) Name the sugar derivatives present in peptidoglycan.

Q2) Write short notes on [ANY FOUR]   **[16]**

   a) Buffers

   b) Tyndall's experiment

   c) Rickettsia

   d) Polysaccharides

   e) Structure of endospore

   f) Importance of fungi

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

   a) Diagrammatically illustrate structure of Gram negative bacterial flagella.

   b) Describe vesicles found in bacteria.

   c) Explain developments in field of microscopy.

   d) Enlist contributions of Pasteur.

   e) Compare in tabular form – nuclear regions of procaryotes and eucaryotes.

   f) Explain role of Bacillus in natural environment and human health.

Q4) Explain ANY TWO of the following :-   **[16]**

   a) Developments in field of genetics.

   b) General characters of viruses.

   c) Structure of bacterial cell membrane

   d) role of proteins

Q5) Attempt ANY ONE of following :-   **[16]**

   a) Describe life cycle of plasmodium in detail.

   b) How did Robert Koch establish aetiology of anthrax? Enlist Koch's postulates and add a note on his other contributions to microbiology.

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[4317]-18

F.Y. B.Sc.

MICROBIOLOGY

Basic Techniques in Microbiology

(2008 Pattern) (Paper - II)

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 astigmatism?

b) Match the following and rewrite

   i) NH_4Cl 1)   'C' source

   ii) Glucose   2)   maintains osmotic pressure

   iii) NaCl   3)   maintains pH

   iv) Buffers   4)   'N' source

c) _____ is an acid fast bacterium and its cell wall contains _____.

d) Mention the pressure, time and temperature regime for sterilization in autoclave.

e) Name two methods of maintenance of fungal culture.

f) Enlist growth phases in liquid batch culture.

g) In an electron microscope, source of illumination is _____ and lenses are _____.

h) What are photo autotrophs. Give one example.

Q2) Write short note on (Any four) :   **[16]**

a) Possible hazards in Microbiology Laboratory.

b) Numerical aperture.

c) Accentuators.

d) Cultivation of photosynthetic organism.

e) Culture collection centre.

f) Diauxic Growth.

Q3) Attempt <u>any four</u> of the following : **[16]**

    a) Justify - Light rays of short wavelength give better images.

    b) What is special staining? Explain method of capsule staining.

    c) Comment on use of filtration as a sterilization agent.

    d) Explain - Enrichment and enriched media.

    e) Differentiate in tabular form - chemostat and turbidostat.

    f) What is synchronous culture? Explain any one method for obtaining it.

Q4) Attempt <u>any two</u> of the following : **[16]**

    a) What is differential staining? Describe the principle, procedure and significance of Gram staining.

    b) What are differential and selective media? Explain their significance with suitable example.

    c) Enlist methods for enumeration of bacteria. Explain any two methods in detail.

    d) What is pure culture? Describe any one method of obtaining pure culture.

Q5) Attempt <u>any one</u> of the following : **[16]**

    a) With proper ray diagram explain principle, working and applications of phase contrast microscope.

    b) What is an ideal disinfectant? Explain the mechanism of action of any four chemical agents.

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[4317]-24
F.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS-2: Defence Mechanism and Military Career in India
(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.*

Q1) Answer in twenty words each (Any Ten) :   **[20]**

   a)   Define Intelligence.

   b)   State any two role of Territorial Army.

   c)   What do you mean by Revolution in Military Affairs?

   d)   Where the Eastern Command of Indian army is located?

   e)   Indian Air Force is divided into how many commands?

   f)   State any two objectives of Coast Guard.

   g)   State the meaning of Integrated Defence Staff.

   h)   State any two functions of the Civil Defence.

   i)   Define Maritime Strategy.

   j)   Who is the supreme commander of the Indian Armed Forces?

   k)   Define Logistics.

   l)   Define sea power.

   m)   Define Air power.

Q2) Answer in 50 words (Any Two) :   **[10]**

   a)   Explain the role of Signal Corps.

   b)   Describe functions of Army Medical Corps.

   c)   Discuss limitations of Indian Navy.

   d)   What are the functions of National Security Council?

Q3) Answer in 150 words (Any Two) :   [20]
   a) Explain career options in Indian Navy.
   b) Write a note on Indian Home guards.
   c) Explain role of civil Defence in disaster management.
   d) Discuss functions of Ministry of Defence.

Q4) Answer in 300 words (Any Two):   [30]
   a) Write role of Indian Navy in national Economy.
   b) Discuss organization of Indian Air-Force.
   c) Explain characteristics, Role and Limitations of Infantry.
   d) Discuss various types of battleships in Indian Navy.

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F.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-3: Evolution of Defence, Science and Technology

(Paper - III) (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 20 words (Any Ten) :   **[20]**

    a) Define "Bio-technology".

    b) Write the long form of I.T.

    c) What do you mean by I.C.B.M.?

    d) Write about "Tactics"

    e) What do you mean by Solar Energy?

    f) Write the duration of World War-II.

    g) When & by whom the First Nuclear bomb it was dropped?

    h) State the meaning of I.R.B.M.

    i) Who introduced the professional Army in Europe?

    j) By whom the U-Boat it was introduced during World War-I?

    k) What do you mean by RADAR?

    l) When & where the industrial revolution it was took place?

    m) Write any two principles of Nepoleanic Warfare.

Q2) Answer in 50 words (Any Two) :   **[10]**

    a) Explain the concept of "Strategic Minerals".

    b) Write in brief "Conventional War".

    c) Explain in short "Various sources of Conventional Energy"

    d) Write in brief "Emergence of General Staff".

Q3) <u>Answer in 150 words</u> (Any Two) :   **[20]**

    a) Discuss the "Blitez Criege Tactics" during World War-II.

    b) What were the implications of "Gun Powder" on contemporary warfare.

    c) Write a note on "L.I.C. in Indias North-East region".

    d) Explain the role of Tank during World War-I.

Q4) <u>Answer in 300 words</u> (Any Two):   **[30]**

    a) Write a note on "Trench Warfare" during World War-I.

    b) Establish the relationship between Energy Security and National Security.

    c) Explain the end of World War Second with special reference to the "Dawn of Nuclear Era".

    d) Write an essay on "Various Military Technologies".

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[4317]-26

F.Y. B.Sc.
ENVIRONMENTAL SCIENCE - I
ENV-101: Life Sciences-Basic Biology and Natural Resources
(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 to the right indicate full marks.*

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

a) What is taxonomy?

b) Define-evolution.

c) How microbes are classified?

d) Give any two examples of Mesophytes.

e) Write any two effects of modern agriculture on environment.

f) Give the examples of fossil fuels.

g) Mention any two mineral resources.

h) Write features of fresh water.

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

a) Describe role of microbes in soil.

b) Explain process of nomenclature in plants.

c) Enlist the effects of drought on environment.

d) Write about energy resources of India.

e) Describe the process of insect preservation.

f) Explain agricultural potential of India.

[4317]-27

F.Y. B.Sc.

ENVIRONMENTAL SCIENCE

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

(2008 Pattern)(Paper - II)

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) Give names of any two Halogenated compounds.

b) What are surfactant?

c) What is Gibb's Energy?

d) Give any four names of green house gases.

e) Define condensation.

f) Give any two macronutrients in soil.

g) What is lithosphere?

h) Draw 'Rock Cycle'.

Q2) Attempt <u>any four</u> of the following :   **[16]**

a) Enlist the effects of mercury on human body.

b) Explain chemical reactions of ozone depletion.

c) What are carcinogen? Add a note on its effects.

d) Discuss 'adiabatic lapse rate'.

e) Describe process of 'Evolution of Atmosphere'.

f) Discuss types of rock with suitable examples.

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

   a) Surfactant.

   b) Chemical potential and chemical equilibrium.

   c) Effects of Hydrocarbons.

   d) Atmospheric stability.

   e) Factors affecting on wind.

   f) Soil classification.

Q4) Attempt <u>any two</u> of the following : **[16]**

   a) What are pesticides? Discuss problems associated with DDT.

   b) Describe physical and chemical properties of lead.

   c) Discuss structure and chemical composition of atmosphere.

   d) Enlist physical and chemical properties of soil.

Q5) Discuss unusual physical properties of water. Add a note on 'H' bonding in water. **[16]**

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

Describe internal structure of the Earth. Add a note on continental and oceanic crust formation.

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F.Y. B.Sc. (Vocational)

INDUSTRIAL CHEMISTRY - I

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

Time :3 Hours]   *[Max. Marks :80*

Instructions to the candidates :

1) *All questions are compulsory.*
2) *Answers to the two sections should be written in separate books.*
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.*

SECTION - I

Q1) Define and explain the following terms :   **[8]**

    a) Chemical adsorption.

    b) Isoelectric point.

    c) Aerosoles.

    d) Homogeneous catalysis.

Q2) Answer <u>any two</u> of the following :   **[8]**

    a) Explain energy profile diagram for a reaction with and without catalyst.

    b) Define and explain catalytic poisoing with examples.

    c) Where the following catalyst are used?
       i)   Pt-gauze
       ii)   Nickel
       iii) H_gSO_4 and
       iv)   Zymase

Q3) Answer <u>any two</u> of the following :   **[8]**

    a) What are emulsions and emulsifier? Explain with examples.

    b) Define adsorption. Explain Freundlich adsorption isotherm.

    c) Differentiate between lyophillic and lyophobic sols.

Q4) Answer <u>any one</u> of the following : [8]

a) Explain characteristics of catalytic reaction in detail.

b) Give brief account of Adsorption chromatography and Adsorption indicators.

Q5) Write short notes on <u>any two</u> : [8]

a) Tyndal effect.

b) Gels.

c) Enzyme Catalysis.

SECTION - II

Q6) Define and explain the following terms. [8]

a) Triple point of water.

b) Yield.

c) Limiting reactant.

d) Mole fraction.

Q7) Answer <u>any two</u> of the following : [8]

a) Explain the different types of latent heats associated with phase change with suitable examples.

b) Discuss any two methods for solving problems of material balance of systems involving no chemical reaction.

c) Define and explain equivalent weight. Calculate equivalent weight of Oxalic acid. [Mol. Formula $H_2C_2O_4$. $2H_2O$]

Q8) Write short notes on <u>any two</u> of the following : [8]

a) Standard heat of reaction.

b) Recycling operations.

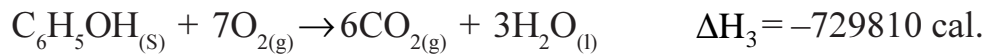c) Material balance involved in extraction.

Q9) Answer <u>any one</u> of the following : [8]

a) State and explain Hess's law of constant heat summation. How it is useful in the determination of heat of formation of hydrocarbons from their heat of combustion studies.

b) State and explain Raoult's Law and Henry's Law. Illustrate with examples.

Q10) Solve <u>any two</u> of the following :   **[8]**

   a) 5 kg of Oxygen in a closed container of volume $1m^3$ is heated at 7 atm. pressure. Calculate maximum temperature attained by gas.

   b) Calculate heat of formation of phenol crystals from its elements.

Data

$$C_{(S)} + O_{2(g)} \rightarrow CO_{2(g)} \qquad\qquad\qquad \Delta H_1 = -94051 \text{ cal.}$$

$$H_{2(g)} + \tfrac{1}{2}O_{2(g)} \rightarrow H_2O_{(l)} \qquad\qquad\qquad \Delta H_2 = -68317 \text{ cal.}$$

$$C_6H_5OH_{(S)} + 7O_{2(g)} \rightarrow 6CO_{2(g)} + 3H_2O_{(l)} \qquad \Delta H_3 = -729810 \text{ cal.}$$

   c) The feed containing 60 mole% A, 30 mole% B and 10 mole% innert material enters reactor. The product stream leaving the reactor is found to contain 2 mole% A. Reaction taking place is

       $2A + B \rightarrow C.$

Find the percentage of original A getting converted to C.

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[4317]-30

F.Y. B.Sc. (Vocational)
BIOTECHNOLOGY
Biochemistry, Biophysics and Instrumentation - I
(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 Section II*

SECTION - I

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

a) What are monosaccharides? Give two examples.

b) Describe the polarity of water molecule.

c) Define isoenzymes.

d) What is a nucleoside?

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

a) Explain the role of lipids in biological system.

b) Describe TCA cycle.

c) How does temperature affect enzyme activity?

d) Explain the structure and types of RNA.

e) Describe the structure of amino acid.

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

a) What are enzymes? How are they classified?

b) How is regulation of glycolysis achieved? Explain in detail.

c) Discuss the structure of DNA.

SECTION - II

Q4) Answer the following questions in short : **[8]**

   a) What is bright field microscopy?

   b) What is centrifugation?

   c) Describe the lens system in a compound microscope.

   d) What do you mean by mobile and stationary phase in chromatography?

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

   a) Write a note on Freeze-Itching technique.

   b) Describe Ion-exchange chromatography.

   c) Describe a phase contrast microscope.

   d) How is UV spectroscopy useful?

   e) Write a note on tubidometer.

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

   a) Describe TEM.

   b) Describe the role of radioisotopes in biological sciences.

   c) What is pH? Explain the working of pH meter.

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F.Y. B.Sc. (Vocational)
ELECTRONICS EQUIPMENT AND MAINTENANCE
Test and Measuring Instruments and Consumer Products
(Paper - I) (2008 Pattern)

Time : 3 Hours]   *[Max. Marks :80*

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

Q1) Attempt the following:

a)   What is accuracy and precision?   **[2]**

b)   What is shielding?   **[2]**

c)   What is spike? What is spike protector?   **[2]**

d)   Fill in the blanks:

   i)   Gain of amplifier is normally represented in .... units. **[1]**

   ii)   The general expression for the frequency of Wien bridge is
         F = ... Hz.   **[1]**

   iii) Microwave oven generates microwave of .... Hz frequency
         to cook food.   **[1]**

   iv)   Battery in PMMC meter is used for measurement of ....   **[1]**

   v)   What is function of delay line in CRO?   **[2]**

   vi)   List different types of circuit breakers.   **[2]**

   vii) If time base is at 2ms/div & one complete cycle covers 5div on
         CRO. Determine the frequency of signal under test.   **[2]**

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

    a)   What are different parts of hearing aid? What are different faults in it? **[4]**

    b)   What is loading effect? Explain. **[4]**

    c)   Explain the working of Electric Iron. **[4]**

    d)   Explain the condition for bridge balance of Maxwell's Bridge. **[4]**

    e)   What are limitations of measuring instruments? **[4]**

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

    a)   What are applications of frequency counter? **[4]**

    b)   Write a note on Cathod Ray Tube. **[4]**

    c)   Explain : series regulator. **[4]**

    d)   Explain the working of series type of Ohmmeter. **[4]**

    e)   Explain the working of On Line UPS. **[4]**

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

    a)   Explain the working of electronic object counter. **[8]**

    b)   Describe the working of pulse generator. **[8]**

    c)   Explain the working of megger. **[8]**

Q5) Attempt any <u>two</u> of the following:

    a)   What are different types of Oscilloscope probes? Explain. **[8]**

    b)   What are precautions remedial measures to eliminate HF noise pick up? **[8]**

    c)   Explain the concept of autoranging. **[8]**

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[4317] - 33

F.Y. B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
Instrumentation and Materials & Design
(Paper - I) (Theory) (2008 Pattern)

Time : 3 Hours]   *[Max. Marks :80*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Answers to the two sections should be written in separate answer books.*
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 Eluent.

 b) Explain Mr.

 c) Give two microbial applications of gas chromatography.

 d) List any 2 centrifugation methods applied in biology.

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

 a) Describe the principle of Fluorimetry.

 b) What is centrifugal force? Describe differential centrifugation.

 c) Give applications of affinity chromatography.

P.T.O.

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

    a)   State Beer and Lambert's law with the mathematical expression.

    b)   What is autoradiography? Give details with example.

    c)   Diagrammatically explain – bottle centrifuge.

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

    a)   Describe ion exchange chromatography.

    b)   Define:

        i)   sensitivity,

        ii)   detection limit,

        iii)   precision,

        iv)   accuracy.

    c)   List important applications of ultra centrifuge.

Q5) Answer *any one* of the following: [8]

    a)   Describe the principle and application of gel exclusion chromatography.

    b)   Describe the principle and method of density gradient centrifugation. Supplement your answer with appropriate examples.

SECTION - II

Materials & Design

Q6) Attempt the following: [8]

    a)   List the different types of steel. Explain the properties of stainless steel that make it suitable as a construction material of bioreactor vessels.

    b)   Name any two types of glass. Give the name and properties of the glass that is usually used in construction of parts of bioreactors.

    c)   Define the term 'oligodynamic action'.

    d)   What is 'biofouling'? Explain its significance in fermentations.

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

    a)   What are thermoplastics? Name any two thermoplastics used in fermenter construction. List any two properties that make them compatible for use in bioprocesses.

b)   If the height of a fermenter is 8m, and the H/D ratio is 2.0, determine the diameter of the impeller and the width of the baffle plate.

c)   State those properties of Teflon that make it compatible for use in bioprocesses.

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

a)   Explain the four most important common properties of materials that are used in construction of bioreactor vessels.

b)   Illustrate how one would represent an orthographic projection of an object. Draw and label appropriately.

c)   What is corrosion of metals? Explain how it is involved in bioreactor designing.

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

a)   List and explain the limitations of using borosilicate glass in construction of parts of bioreactors.

b)   Explain why engineering drawings have to be to scale.

c)   Draw a cube in its parallel and angular perspective views. Label appropriately.

Q10) Answer the following: **[8]**

Given below is an object whose top view is shown. Using the glassbox approach, draw any one side view of the object. **Use a graph paper for the drawing**.
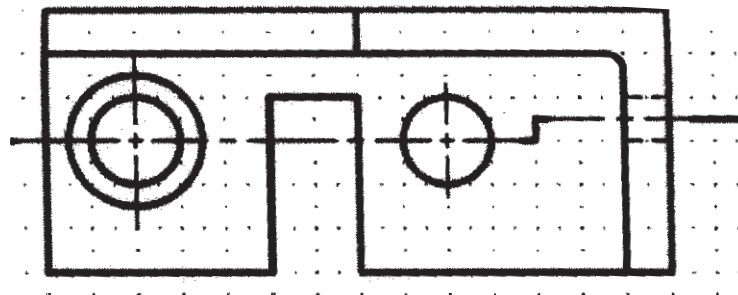
[4317] - 34

F.Y. B.Sc. (Vocational)
COMPUTER HARDWARE & NETWORK ADMINISTRATION
Essentials of Computers
(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: **[16]**

a) What are different voltages provided by SMPS for computer?

b) What is meant by nested interrupt?

c) What is computer? Why it is also called as data processor?

d) Write full forms of : CAD, BCD, SIMM, MICR.

e) How you can explain Hardware and Software by example?

f) What is 'MODEM'?

g) What is the meaning of Random and sequencial access?

h) If there are 3 platters of hard disk, how many read/write heads will be required in movable arm?

Q2) Attempt any FOUR: **[16]**

a) Explain working of MOUSE.

b) Write in short 'History of Computers'.

c) What are Add on cards? What is their use?

d) Explain the concept 'iRAM'.

e) Distinguish between Online/Offline UPS.

f) What is the relation between MAR & MBR/ IP & PC with different type of buses? Explain it in brief.

P.T.O.

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

a) Explain 'sound handling' in computer.

b) Write a short note on 'Plotter'.

c) What are memory modules?

d) Give information on sockets and slots of microprocessor.

e) Distinguish between Primary and Secondary memory.

f) What is device controller? Give examples.

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

a) Explain functional block diagram of computer in detail. Write a note on Front and rare panel, connectors, switches and indicators.

b) What is Scanner? Give detailed types.

c) i) Discuss working of compact disc.

   ii) Write short note on 'Touch Screen Panel'.

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

a) Write a note on 'Printers' with detailing LASER printer's block diagram and working.

b) Explain control unit of computer with details of its types.

c) i) How microprocessor works as CPU?

   ii) Explain capacitive type of keyswitches. Where they are used?

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[4317] - 35

F.Y. B.Sc. (Vocational)
SEED TECHNOLOGY
Morphology, Seed Development,Testing for Cultivar Genuineness and Plant, Breeding for Crops Improvement
(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 labeled diagrams wherever necessary.

Q1) Attempt the following: **[8 x 2 = 16]**

   a)   Enlist any two agencies of allogamy.

   b)   What is a seed?

   c)   Define polyembryony.

   d)   Enlist any two types of dehiscent fruits.

   e)   What is plant breeding?

   f)   Give any two merits of mass selection.

   g)   What do you mean by breeding for disease resistance?

   h)   Define selfing.

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

   a)   Sketch, label and describe the T.S. of typical anther.

   b)   Give the distinguishing characters of family Malvaceae.

   c)   Explain grow out test in cotton.

   d)   Define a clone. Give the characters of a clone.

   e)   Describe the development of double cross hybrid.

   f)   Describe any two modes of natural vegetative propagation.

Q3) Write notes on any four of the following: **[4 x 4 = 16]**

    a)   Parts of a typical flower.

    b)   Distinguishing characters of family Liliaceae.

    c)   Criteria for harvesting of fruits and seeds.

    d)   Classification of mutation.

    e)   Characters of pureline selection.

    f)   Somaclonal variation.

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

    a)   Describe the development of dicotyledonous embryo.

    b)   What is megasporangium? Describe the development of female gametophyte.

    c)   State and explain the law of independent assortment with a suitable example.

    d)   What is introduction? Give the objectives and types of introduction.

Q5) What is fertilization? Explain the process of fertilization in angiosperms. **[16]**

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

What is hybridization? Explain its technique in self pollinated crops.

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[4317] - 36
F.Y. B.Sc. (Vocational)
INDUSTRIAL CHEMISTRY - II
(Paper - II) (2008 Pattern)

Time : 3 Hours]   *[Max. Marks :80*

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Answers to the two sections should be written in separate books.

    3)   Neat diagrams must be drawn wherever necessary.

    4)   Figures to the right indicate full marks.

    5)   Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

    6)   All questions carry equal marks.

SECTION - I

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

    a)   Give any two uses of solid fuels.

    b)   What is producer gas?

    c)   What is meant by carbonisation?

    d)   Name a few substances present in coal tar.

Q2) Attempt <u>any two</u> of the following: **[8]**

    a)   Give the chemical constitution of coal.

    b)   Describe the synthesis of bio-gas.

    c)   What is calorific value? How is it estimated by different methods?

P.T.O.

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

    a)   Discuss in brief distillation of coal tar.

    b)   Give detailed classification of gaseous fuels.

    c)   Write a short note on origin of petroleum.

Q4) Answer <u>any one</u> of the following: **[8]**

    a)   What is cracking? Differentiate between thermal and catalytic cracking.

    b)   Discuss the advantages and disadvantages of solid fuels over gaseous and liquid fuels. List a few industrial solid fuels.

Q5) Answer <u>any one</u> of the following: **[8]**

    a)   i)   Write a short note on processing of liquid fuels.

            ii)   The ultimate analysis of a coal gave the following results : $C = 82\%$, $S = 2.5\%$, $N = 0.8\%$, $H = 5.8\%$ and $O = 8.9\%$ calculate the gross and net calorific value of the coal using Dulong's formula.

    b)   Write a short note on aviation gasoline and

          Define :   i)   Flash point.

                  ii)   Ignition temperature.

SECTION - II

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

    a)   Define Electrometallurgy.

    b)   Define flux. Give examples.

    c)   Differentiate between ore and an alloy.

    d)   Give names of oils used as frothers in froth floatation process.

Q7) Attempt <u>any two</u> of the following: **[8]**

a) Write a short note on clay.

b) What is an ore? Classify different types of ores.

c) What is meant by roasting? Give different types of roasting.

Q8) Attempt <u>any two</u> of the following: **[8]**

a) What is meant by concentration of ore? Discuss in detail any one method.

b) What are zeolites? Discuss it's applications in detail.

c) Classify coal on basis of it's carbon content.

Q9) Answer <u>any one</u> of the following: **[8]**

a) Discuss the different steps in the extraction of a metal from it's ore.

b) What is reduction? Discuss the use of different reducing agents in metallurgy.

Q10) Answer <u>any one</u> of the following: **[8]**

a) What are furnaces? Describe different types of furnaces used in extractive metallurgy.

b) Discuss the principles of extraction of metals from sulphide ores.

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F.Y. B.Sc. (Vocational)
BIOTECHNOLOGY - II
Microbiology and Mathematics, Statistics and Computers for Biologists
(Paper - II) (2008 Pattern)

Time : 3 Hours]   *[Max. Marks :80*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Draw neat labeled diagrams wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use separate answer books for Section - I and Section - II.*

SECTION - I
(Microbiology)

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

    a) What are obligate anaerobes? Give two examples.

    b) Explain mutualism.

    c) Enlist the ingredients of nutrient agar.

    d) Give the significance of MPN.

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

    a) Describe Gram staining as differential staining.

    b) Explain the five kingdom system of classification.

    c) What is sterilization? Describe sterilization by radiation.

    d) How are viruses classified?

    e) Discuss the contributions of Louis Pasteur to microbiology.

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

    a)   What are the steps involved in coliforms testing? Describe the presumptive test.

    b)   Describe the replica plating technique for screening of mutants.

    c)   Describe differential media with examples.

SECTION - II

(Mathematics, Statistics and Computer for Biologists)

Q4) Answer the following questions in short: **[8]**

    a)   If $f(x) = x^2 \log(x^2 + 1)$, find $\dfrac{df}{dx}$.

    b)   Evaluate $\displaystyle\lim_{x \to 3} \dfrac{(x-1)(x^2-9)}{x-3}$.

    c)   Make a list of devices of computer.

    d)   Define mean. Give a formula to calculate mean.

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

    a)   Evaluate $\displaystyle\int_0^\pi e^{(3+2\tan x)} \sec^2 x \, dx$

    b)   If $\sin\theta = \frac{1}{4}$, then find $\cos\theta$, $\tan\theta$, $\sec\theta$ and $\operatorname{cosec}\theta$.

    c)   If $f(x) = \begin{cases} 2x+5 & ;\text{for } x > 3 \\ x^2 + 2 & ;\text{for } x \leq 3 \end{cases}$. Find $\displaystyle\lim_{x \to 3} f(x)$. Is $\displaystyle\lim_{x \to 3} f(x) = f(3)$?

    d)   What is correlation? Explain negative correlation with example.

    e)   Calculate standard deviation for the given data series:

        24,26,20,28,18,22,23,26,25,26,23,22,26,22,24,23,22,22,24.

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

a) i) Find the limit of the sequence $\left\{ \dfrac{\sqrt{n}+1}{n^2+2\sqrt{n}+2} \right\}_{n=0}^{\infty}$.

ii) Discuss the convergence of the series $\sum_{n=0}^{\infty} \left[\left(\dfrac{2}{3}\right)^n +2 \right]$.

b) i) Evaluate $\int_0^{\pi} \sin x \cos x\, dx$.

ii) If $y=\left(x+\dfrac{1}{x} \right)\left(5x^2 - \dfrac{1}{x^2} \right)$, find $\dfrac{dy}{dx}$.

c) Describe binormal distribution with suitable example.

d) What is an experiment? Give various steps involved in setting an experiment.

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F.Y. B.Sc. (Vocational)
ELECTRONICS EQUIPMENT AND MAINTENANCE (EEM)
Maintenance Concepts and Repair
(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)   Draw neat diagrams wherever necessary.

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

a)   "Inductor is a wattless component". Comment.

b)   Explain the term absolute maximum rating.

c)   State advantages of double sided P.C.B.

d)   Explain Reliability.

e)   Explain PTH PCB.

f)   Explain crimping.

g)   Explain the function of flux in soldering.

h)   Explain the function of starter in tubelight.

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

a)   With the help of a neat diagram explain internal connections of bread board.

b)   Explain the importance of information printed on body of devices.

c)   State the factors on which MTBF depends.

d)   State the importance of service manual.

e)   Explain the difference between good solder joint and bad solder joint.

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

    a)   Write a note on causes and indications of failure.

    b)   Write a note on tools used for soldering.

    c)   With the help of a neat diagram explain the wiring of fan and regulator.

    d)   Explain the importance of earthing and explain how it is done.

    e)   Explain different precautions to be taken while handling electrical gadgets.

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

    a)   With the help of a neat diagram explain the working of a M.C.B.

    b)   Explain causes and remedies of dry solder and cold solder joints.

    c)   Explain the factors on which MTR depends.

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

    a)   What precautions should be taken while drawing a P.C.B. layout.

    b)   With the help of a neat diagram explain IFT and what does tuning of IFT means.

    c)   Write a note on different types of wires.

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F.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

Mathematics and Statistics for Biologists

Microbial Diversity & Cultural Methods and Mathematics & Statistics for Biologists

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

Time : 3 Hours] *[Max. Marks :80*

Instructions to the candidates:

1) *All questions are compulsory.*
2) *Answers to the two sections should be written in separate answer books.*
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 & Cultural Methods

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

a) Define the term "thermophiles" and give names of two media used for cultivating them.

b) Name any two enrichment media used for isolation of bacteria.

c) Name any two International Culture Collections.

d) List any two media used for cultivation of fungi.

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

a) What is an enriched cultivation medium? Name any one such medium and explain its use.

b) What is a chemolithotroph? Give two media used for growing chemolithotrophs.

P.T.O.

c) List the conditions that are used to simulate the growth conditions of cyanobacteria when they are cultivated in the laboratory.

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

a) What is a minimal medium? What is the need of using such a medium.

b) List the ingredients of a complex medium used for enrichment of sulfate reducing bacteria.

c) Explain the need for having Culture Collections. Explain their role.

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

a) Give a protocol for preservation of bacteria by lyophilization.

b) Explain how the knowledge of the natural habitat of a microorganism can help in isolating it in the laboratory.

c) Name any two methods by which actinomycete cultures can be stored for extended periods of time.

Q5) Answer *any two* of the following: **[8]**

a) List the methods used to preserve spores, stating the advantages of preserving spores as against whole cells.

b) What are halophiles? Explain how they can be cultivated.

c) What are 'oligophilic' bacteria'? Explain the need to design special media for their cultivation.

SECTION - II

Mathematics and Statistics for Biologists

Q6) Answer *any four* of the following: **[8]**

a) Define 'range' giving example.

b) Name any two measurements of central tendencies and any two measurements of dispersal.

c) Explain in brief - Random.

d) Study of biology with the help of statistics is also named as ————.

i) Bio computing   ii) Biometry

iii) Statometry   iv) Biometrics

e)   Choose the right option and complete the sentence:

Average is calculated as ───────

i) $n_1 + n_2 + n_3 + n$ .... $+ n_x / x$

ii) $n_1 + n_2 + n_3 + n$ .... $+ n_n / x$

iii) $n_1 + n_2 + n_3 + n$ .... $+ n_x / n$

iv)   none of the mentioned.

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

a)   Write a short note on Poisson distribution giving examples.

b)   Illustrate how continuous and discrete frequency distributions are graphically represented with appropriate examples.

c)   Measurements of heights (inches) of brother and sister were made in each of the following two child families, with the following results. Calculate the correlation coefficient between the two heights.

Family	1	2	3	4	5	6
Brother, x	73	70	74	68	70	67
Sister, y	69	67	63	66	67	64

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

a)   Explain the importance of Type I error and Type II error in hypothesis testing.

b)   Write a note on evolution and Hardy Weinberg equation.

c)   Explain the terms:

i)   Population.

ii)   Universe.

iii) Parameter.

iv)   Statistics.

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

a) Total protein content (mg) of seeds of two plant types of *Phaseolus vulgaris* (Kidney beans) are given. Test whether mean total protein content of two plant types of *Phaseolus vulgaris* is significant or not.

Sample A (Control)	Sample B (Mutant)
1.8	2.3
1.9	2.4
2.0	2.5
2.1	2.5
2.2	2.7
2.3	2.8
2.4	2.9
2.5	3.0
2.6	3.1
2.6	3.2

b) Write a short note on Gaussian distribution.

c) Differentiate between Paired and unpaired t test.

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

a) Explain the importance, assumptions and limitations of Hardy-Weinberg equilibrium in population genetics.

b) Illustrate graphically and write equations for the growth of a population in which the intrinsic birth rate is constant and death rate increases with population density.

c) What is difference between regression and correlation analysis?

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F.Y. B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Computer Organisation

(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)   *Draw neat diagrams wherever necessary.*

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

    a)   Define Hardware.

    b)   Define Microprocessor.

    c)   What is UART?

    d)   List different segment registers of 8086.

    e)   What is LAN?

    f)   What is Internet?

    g)   Define Editor.

    h)   Define Software.

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

    a)   Define System software.

    b)   Define:

        i)   POST.

        ii)   BIOS.

    c)   Explain data transfer instructions of 8086.

    d)   Define Math Co-processor.

    e)   Draw and explain basic symbols used in flowchart.

    f)   Define Multimedia.

Q3) Attempt any four: [16]

    a)   Explain features of 80386.

    b)   Define the terms:

        i)   Simulator.

        ii)   Emulator.

    c)   What is algorithm?

    d)   Define Application Software.

    e)   Explain the main functions of DOS.

    f)   List different network topologies.

Q4) Attempt any two: [16]

    a)   With diagram explain logical system architecture of computer.

    b)   Write short notes on network operating system.

    c)   Write short notes on buffer, tristate buffer & explain the need of buffer.

Q5) Attempt any two: [16]

    a)   Explain FDC with block diagram.

    b)   Explain Architecture of 8086 with block diagram.

    c)   Write short notes on:

        i)   Window operating system.

        ii)   Arithmetical instructions of 8086.

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F.Y. B.Sc. (Vocational)
SEED TECHNOLOGY
Seed Physiology and Seed Production
(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) *Draw neat labeled diagrams wherever necessary.*

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

   a) Comment on germination inhibitors.

   b) Give the chemical composition of seed.

   c) Enlist different types of seed storage products.

   d) What are orthodox seeds?

   e) Comment on quality of irrigation water.

   f) What is roughing?

   g) Comment on land preparation.

   h) What are foundation seeds?

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

   a) Comment on preparation of land for transplanting.

   b) Explain seed as a basic input in agriculture.

   c) Comment on water and nutrient management in nursery.

   d) Explain seedling abnormalities and its causes.

   e) Comment on seed deterioration during storage.

   f) Explain physiology of seed development.

P.T.O.

Q3) Write notes on (Any four): **[16]**

    a)   Seed ageing.

    b)   Invigoration treatment to improve seedling establishment.

    c)   Synthetic seeds.

    d)   Basal doses.

    e)   Previous crop effects.

    f)   Characteristics of fertile soil.

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

    a)   Define seed dormancy. Explain various methods to break dormancy.

    b)   Describe types of seed germination. Add a note on seedling abnormalities.

    c)   Explain importance of agriculture in high value seed production.

    d)   Describe various sources of irrigation.

Q5) Define seed vigour. Explain various factors affecting seed vigour and add a note on physiology of seed vigour. **[16]**

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

Define genetic purity of seeds. Explain various methods to maintain genetic purity of seeds and add note on seed village concept.

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F.Y. B.Sc.

PHYSICS - II

Emerging Physics and Electricity and Magnetism
(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 log tables and calculator is allowed.*
4) *Draw neat diagram and sketches wherever necessary.*

Q1) Attempt all of the following :

a) Define population inversion.   **[2]**

b) What is meant by heliocentrism?   **[2]**

c) What is meant by ECG?   **[2]**

d) The resistance of platinium wire is 6 ohms at 0°C and 7.2 ohms at 100°C. Calculate the temperature coefficient of resistance α.   **[2]**

e) Define magnetisation ($\overline{m}$).   **[2]**

f) Define electric potential.   **[2]**

g) What do you meant by magnetic field?   **[2]**

h) Calculate force between two balls each having a charge of 12 μc and are 8 cm. apart.   **[2]**

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

a) Explain two level and three level pumping schemes.   **[4]**

b) Write notes on ERG and EOG.   **[4]**

c) Explain top-down approach for synthesis of nanoparticles.   **[4]**

d) Amount of radient energy received by the detector of pyrometer per unit time is 20J from a hot body. If emissivity is 5.6×10^{-3}, then find the temperature of hot body ($\sigma = 5.72 \times 10^{-8}$ w/m^2 K^4).   **[4]**

e) The energy difference between two laser levels is 0.0117 ev. Determine the frequency and wavelength of the radiation (h = 6.626×10^{-34} J.s, C = 3×10^8 m/s).   **[4]**

f) The intracellular K$^+$ concentration of a group of cells averages 160×10^{-6} moles/cm^3. The extracellular concentration of K$^+$ averages 6.5×10^{-6} moles/cm^3. Calculate Nernst potential.   **[4]**

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

   a) Using Gauss's theorem, obtain an expression for the electric intensity at an internal point due to uniformly charged non-conducting sphere. **[4]**

   b) Using Biot-Savart's law, obtain an expression for magnetic field produced by long straight conductor. **[4]**

   c) Derive an expression for electric potential energy. **[4]**

   d) A coil of resistance 20 ohms and inductance .5 henry is connected to 50V. d.c. battery. Calculate : **[4]**

      i) The steady current.

      ii) The rate of increase of current at the instant of closing the switch.

   e) An electric dipole consisting of two opposite charges each of magnitude 2.00 μc are separated by a distance 2.0cm. The dipole is placed in an external field of intensity 1×10^5 N/C. Calculate the maximum torque on the dipole. **[4]**

   f) The following figure shows two long straight wires carrying electric currents 10A in opposite directions the separation between wires is 4cm. Find magnetic field at a point p midway between the wires. **[4]**
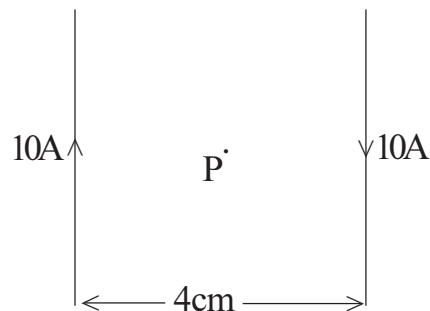
Q4) Attempt <u>any two</u> of the following :

   a) Write short note on contribution of Indian Scientists C.V.Raman, Bose, Saha and Chandrashekar in development of physics. **[8]**

   b) i) The He-Ne system is capable of lasing at several different IR wavelengths, one being 1.15μm. Determine the energy difference between the upper and lower levels for this wavelength. **[4]**

      ii) Explain the working of photodiode. Write applications of photodiode. **[4]**

   c) i) Calculate bandgap of 5 silicon atoms if energy gap of silicon atom is 1.1 ev. **[4]**

      ii) Explain any four applications of nanomaterials. **[4]**

Q5) Attempt <u>any two</u> of the following :

a) What is dielectric material? What is the effect of dielectric material on the capacitance. **[8]**

b) i) Obtain an expression for magnetic field on the axis of current carrying circular loops. **[4]**

   ii) A solenoid of 500 turns/m is carrying a current of 2A. Its core is made of iron which has a relative permeability of 5000. Determine the magnitudes of magnetic intensity, magnetization and the magnetic field inside the core. **[4]**

   $(\mu_o = 4\pi \times 10^{-7}$ wb/A.m).

c) i) Explain the terms : Magnetic susceptibility and magnetic permeability. **[4]**

   ii) A capacitor of capacitance 0.4μf is discharged through a resistance of 10^7 ohm. Find the time taken for half the charge on the capacitor to escape. **[4]**

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F.Y. B.Sc.

CHEMISTRY - I

Physical and Inorganic Chemistry

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

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) Find the value of y in the equation $y = 10^{-0.2218}$.

   b) Define the term surface tension.

   c) What is the effect of temperature on viscosity?

   d) Explain the term catalyst with example.

   e) State second law of thermodynamics in the form of entropy.

   f) BeF_2 is linear but SF_2 is angular. Why?

   g) How many moles are present in 90 grams of water.

   h) What are the types of hydrogen bond.

Q2) a) Attempt <u>any four</u> of the following :   **[8]**

   i)   Calculate the pH of 1.2×10^{-3}M HCl.

   ii) Find the value of x if $\log_e 6.321 = x$.

   iii) State any two rules of derivative.

   iv) Find the equation of line passing through the two points $(-1, -1)$ and $(2, 6)$.

   v) Arrange the following equation in the form of $y = mX + C$ and find out slope and intercept.

      $15 y = X + 30$.

   vi) If $y = \dfrac{x}{x^2 + 1}$, find $\dfrac{dy}{dx}$.

   vii) If $y = (3x^2 + 1)(x^3 + 2x)$; find $\dfrac{dy}{dx}$.

   viii) $\displaystyle\int_{2}^{8} x^3 . dx = ?$

b) Define the term surface tension. Explain its determination by capillary method. **[4]**

c) Attempt <u>any one</u> of the following : **[4]**

   i) Calculate the pressure exerted by one mole of CO_2 at 127°C when it occupies a volume of 0.5 liter.

   (Given : $a = 3.66$ atm l^2 mole^{-2}; $b = 0.0428$ l mole^{-1} and R = 0.082 lit atm k^{-1} mole^{-1}).

   ii) Calculate the entropy change when one mole of an ideal gas is heated from 100°C to 200°C at constant pressure. When Cp is 7.88 cal deg^{-1} mole^{-1}.

Q3) a) Attempt <u>any three</u> of the following : **[12]**

   i) Describe Thomson's method for the determination of e/m ratio of an electron.

   ii) Explain the concept of entropy. Discuss its physical significance.

   iii) Define viscosity of a liquid. Give its unit. Discuss the method to measure the viscosity of liquid by Ostwald's method.

   iv) What is enzyme catalysis? Explain its characteristics.

b) Attempt <u>any one</u> of the following : **[4]**

   i) Calculate the wavelength of the spectral line in the Lyman series when electron jumps from fourth orbit.

   ii) Calculate the energy of electromagnetic radiation of wavelength 500 nm.

Q4) a) Attempt <u>any three</u> of the following : **[12]**

   i) State different methods for preparation of colloids. Describe any one method in detail.

   ii) What are the drawbacks of Rutherford's atomic model.

   iii) Distinguish between emulsion and gel.

   iv) Explain the adsorption theory of catalysis with the help of suitable example.

   v) What are quantum numbers? Give their significance.

b) Attempt <u>any one</u> of the following : **[4]**

   i) Explain the effect of hydrogen bonding on solubility in water and viscosity of compound.

   ii) What is hybridization? Explain formation of CH_4 molecule.

Q5) a) Attempt <u>any two</u> of the following : [6]

     i)   What is heavy water? How it is obtained? Give its any one property.

     ii)   Give the assumptions of VSEPR theory.

     iii)   How will you prepare?

          1)   300 ml of 0.1N solution of oxalic acid ($H_2C_2O_4.2H_2O$).

          2)   200 ml of 0.05N solution of NH_4Cl.

             (Given : At.wt. of H = 1, C = 12, O = 16, N = 14, Cl = 35.5).

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

     i)   Explain the formation of HF and N_2 molecules on the basis of valence bond theory.

     ii)   State postulates of Heitler - London theory.

     iii)   How will you prepare 0.25 N, 500 ml Hydrochloric acid solution from concentrated hydrochloric acid solution whose specific gravity is 1.18 and contains 35% HCl by weight.

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F.Y. B.Sc.

MATHEMATICS

Algebra and Geometry

(2008 Pattern) (Paper - I)

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 the subquestions: **[16]**

   a)   Define power set of a set. Let A = {a, b, c}. Find power set of A.

   b)   Find the value of $\dfrac{\phi(10)-\phi(3)}{\phi(4)}$ where ϕ is Euler's phi-function.

   c)   Express $-1 + i$ in polar form.

   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 $3x^2 + 2xy + 3y^2 - 4x + 2y + 1 = 0$.

   f)   Obtain the equation of line joining the points (1, 2, 3) and (–2, 1, –2).

   g)   Find the equation of the sphere on AB as a diameter where A (2, –3, 1) and B (–1, –2, 4).

   h)   Reduce the matrix $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}$ to row echelon form. Hence find its rank.

Q2) Attempt any <u>four</u> of the following: **[16]**

   a)   Let $f : R \rightarrow R$ be a function defined by $f(x) = \dfrac{5x-2}{7}$. Show that the function f is bijective. Also find a formula for f^{-1}.

b) Let R be defined on the set of integers Z by $xRy \Rightarrow 5x+6y$ is divisible by 11, for $x, y \in Z$. Show that R is an equivalence relation.

c) If P is prime and a,b are integers. Show that $P|ab$ then $P|a$ or $P|b$.

d) In Z_{12}, Calculate

i) $(\overline{2}.\overline{9}+\overline{1})^{-1}$.

ii) $-\overline{5}(\overline{4}+\overline{5})$.

e) Find the modulus and argument of $z=(-1+i)^3$.

f) Find the values of a and b if 2 and -3 are the roots of the equation $2x^4+3x^3-12x^2+ax+b=0$.

Q3) Attempt any <u>two</u> of the following: **[16]**

a) If a and b are any two integers with $a \neq 0$ then prove that there exist unique integers q and r such that $b = aq + r$, where $0 \leq r < |a|$.

b) State and prove De Moivre's theorem.

c) Find greatest common divisor of 3587 and 1819 and express it in the form $3587 m + 1819 n$.

d) i) For any two complex numbers z_1 and z_2, show that
$$|z_1+z_2|^2+|z_1-z_2|^2=2\left(|z_1|^2+|z_2|^2\right).$$

ii) Solve the equation $2x^3-7x^2+7x-2=0$; given that the two roots are reciprocals of each other.

Q4) Attempt any <u>four</u> of the following: **[16]**

a) If under rotation of axes, without shifting the origin, the expression $ax^2+2hxy+by^2$ is transformed to $a'x'^2+2h'x'y'+b'y'^2$ then show that $a+b=a'+b'$.

b) If α,β,γ are the angles made by the line with positive direction of co-ordinate axes then prove that $\cos^2\alpha+\cos^2\beta+\cos^2\gamma=1$.

c) Find the point where the line passing through the point $(0, -1, 2)$ and having direction ratios $(2, -1, 3)$ meets the plane $x-y-2z=0$.

d) Find the equation of the sphere passing through the circle $x^2+y^2+z^2+2x-2y-2z-1=0$; $2x-2y+z-1=0$ and passing through the point $(3, -1, 1)$.

e) Find the points at which the line $\dfrac{x-7}{2}=\dfrac{y-6}{1}=\dfrac{z+5}{-1}$ cuts the sphere $x^2+y^2+z^2-2x+3y-5z-31=0$.

f) Reduce the matrix $A=\begin{bmatrix} 1 & 3 & 4 & 3 \\ 3 & 9 & 12 & 9 \\ 1 & 3 & 4 & 1 \end{bmatrix}$ to row echelon form. Hence find its rank.

Q5) Attempt any <u>two</u> of the following: **[16]**

a) Reduce the equation $5x^2+6xy+5y^2-10x-6y-3=0$ to the standard form and name the conic.

b) i) Derive equation of the plane in the normal form.

ii) Show that the two lines $\dfrac{x-1}{-1}=\dfrac{y-8}{7}=\dfrac{z-2}{2}$ and $\dfrac{x+1}{1}=\dfrac{y-2}{-1}=\dfrac{z+4}{1}$ are coplanar and find the equation of plane containing them.

c) i) Show that for every real number λ the equation $S+\lambda U=0$ represents a sphere containing the circle of intersection of the sphere $S \equiv x^2+y^2+z^2+2ux+2vy+2wz+d=0$ and $U \equiv ax+by+cz+d'=0$.

ii) Show that the plane $2x - 2y + z + 12 = 0$ touches the sphere $x^2+y^2+z^2-2x-4y+2z=3$. Also find the point of contact.

d) Solve the system of equations.

$x+3y-2z=0$
$2x-y+4z=0$
$x-11y+14z=0$

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F.Y. B.Sc.
MATHEMATICS
Calculus
(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.*

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

   a)   Determine the set $A = \{x \in R \mid |2x - 3| < 5\}$.

   b)   State completeness property of R.

   c)   Show that the sequence $\left(\dfrac{1}{n}\right)_{n=1}^{\infty}$ converges to 0.

   d)   Show that the series $\sum\limits_{n=1}^{\infty} \dfrac{n}{n+1}$ is divergent.

   e)   Show that the function $f(x) = |x|$ is continuous on R.

   f)   Use definition of derivative to find $f'(x)$, where $f(x) = x^2$.

   g)   Find $\lim\limits_{x \to \infty} \dfrac{\log x}{x}$.

   h)   If $y = (ax + b)^m$, then find nth derivative y_n.

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

   a)   If $x \in R$, then show that there exists $n_0 \in N$ such that $x < n_0$.

   b)   Show that between any two distinct real numbers there exists a rational number.

   c)   Prove that $|x + y| \le |x| + |y|$, for all $x, y \in R$.

P.T.O.

d) If $a > 0$, then show that $\lim\limits_{n\to\infty}\left(a^{\frac{1}{n}}\right)=1$.

e) If sequence $(x_n)_{n=1}^{\infty}$ converges to x and sequence $(y_n)_{n=1}^{\infty}$ converges to y, then show that sequence $(x_n\,y_n)_{n=1}^{\infty}$ converges to xy.

f) Let $x_1=1$, $x_{n+1}=\sqrt{2+x_n}$ for $n\in\mathrm{N}$, show that sequence $(x_n)_{n=1}^{\infty}$ is convergent, also find its limit.

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

a) Show that a sequence of real numbers is convergent if and only if it is a Cauchy sequence.

b) Test the convergence of following series.

i) $\sum\limits_{n=1}^{\infty}\dfrac{2^n+1}{3^n-1}$.

ii) $\sum\limits_{n=1}^{\infty}\left(\sqrt{n^4+1}-\sqrt{n^4-1}\right)$.

c) Use definition of limit of a function to show,

i) $\lim\limits_{x\to0}\dfrac{2x^2+3}{x+5}=\dfrac{3}{5}$.

ii) $\lim\limits_{x\to c}x^2=c^2$ for any $c\in\mathrm{R}$.

d) Let $A\subseteq\mathrm{R}$, $f,g:A\to\mathrm{R}$ and $c\in\mathrm{R}$ be a cluster point of A. If $\lim\limits_{x\to c}f(x)=\mathrm{L}$ and $\lim\limits_{x\to c}g(x)=\mathrm{M}$ then show that $\lim\limits_{x\to c}\left(\dfrac{f}{g}\right)(x)=\dfrac{\mathrm{L}}{\mathrm{M}}$, provided $\mathrm{M}\neq0$.

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

a) Find α,β if the function $f(x)$ is continuous on $(-3 , 5)$ where,

$$f(x)=\begin{cases} x+\alpha, & -3<x<1 \\ 3x+2, & 1\le x<3 \\ \beta+x, & 3\le x<5 \end{cases}$$

b) Let $I = [a,b]$ be a closed bounded interval and $f:I \rightarrow R$ be continuous on I. Then show that f has an absolute maximum on I.

c) If function f is continuous at $x = c$ and function g is continuous at $f(c)$, then show that the composite function gof is continuous at c.

d) Let $f:[0,1] \rightarrow R$ be continuous, suppose $0 \le f(x) \le 1$, $\forall x \in [0,1]$, show that there exists a point $c \in [0,1]$ such that $f(c) = c$.

e) Determine whether the function $h(x) = x|x|$ is differentiable at $x = 0$. Find $h'(0)$ if it exist.

f) Let $f(x) = x^2 \sin \dfrac{1}{x}$, $x \ne 0$ and $f(0) = 0$. Show that $f'(x)$ exists for all $x \in R$ but $f'(x)$ is not continuous at $x = 0$.

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

a) State and prove Rolle's theorem. Also give its geometrical interpretation.

b) i) Separate the intervals in which the polynomial $2x^3 - 15x^2 + 36x + 1$ is increasing or decreasing.

   ii) If $a < b$ then show that $\dfrac{b-a}{\sqrt{1-a^2}} < \sin^{-1} b - \sin^{-1} a < \dfrac{b-a}{\sqrt{1-a^2}}$ where $a < 1$.

c) i) Evaluate $\lim\limits_{x \to 0} x^{\sin x}$.

   ii) If $y = (\sin^{-1} x)^2$, then prove that
   $(1 - x^2) y_{n+2} - (2n+1) x y_{n+1} - n^2 y_n = 0$.

d) i) Find series expansion of $\tan^{-1} x$ in powers of x.

   ii) Find series expansion of $\log \sqrt{\dfrac{1+x}{1-x}}$ in powers of x.

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[4317] - 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)   The probability that there are 53 Mondays in a randomly chosen leap year is

         A)   1/7   B)   1/14

         C)   1/28   D)   2/7

      ii)   For a sample space $\Omega = \{w_1, w_2, w_3, w_4\}$, $P(w_1) = p$, $P(w_2) = 2p$, $P(w_3) = 3p$, $P(w_4) = 4p$, where $p \geq 0$. For what value of p will this be a probability model?

         A)   1/100   B)   – 1

         C)   10   D)   1/10

      iii)   The probability mass function (p.m.f) of a discrete random variable (r.v.) X is given by,

X	1	2	3	4	5
P (X = x)	0.1	0.25	0.25	0.2	0.2

       What is the P (2 < X < 5)?

         A)   0.9   B)   0.5

         C)   0.45   D)   0.3

      iv)   If X and Y are any two r.vs, then the covariance between a X + b and cY + d (where a, b, c, d are constants) is :

         A)   Cov (X, Y)   B)   abcd Cov (X, Y)

         C)   ac Cov (X, Y)   D)   ac Cov (X, Y) + bd

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

      i)   An event containing all the points of sample space Ω is called as an impossible event.

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ii)   If E (Y) = 3 where $Y = \dfrac{x-2}{5}$, then E (X) = 17.

iii) The first raw moment of a variable is always variance.

iv)   Mode of binomial distribution is unique.

c) Define finite sample space and give one example of it.   **[2]**

d) If the probability generating function (p.g.f.) of a r.v.X is given by

$$G_x(t) = \left(\frac{2}{3} + \frac{1}{3}t \right)^{10}.$$ Find the distribution of X.   **[2]**

e) Define conditional probability of an event.   **[2]**

f) Let A, B, C be any three events defined on Ω. Write expressions for the following events.   **[2]**

   i)   At least one event occurs,   ii)   Exactly one event occurs.

Q2) Attempt <u>any four</u> of the following :   **[4 × 4 = 16]**

a) Define the following terms :

   i)   Event,   ii)   Mutually exclusive events,

   iii) Complement of an event,   iv)   Independence of two events.

b) If A and B are any two events defined on Ω, then prove that,

   $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

c) If P (A) = 0.6, P (B) = 0.5, P (A $\cap$ B) = 0.3

   Compute :

   i)   P (Exactly one of A and B occurs)

   ii)   P (A'/B), where A' is the complement of A.

d) State and prove Bayes' theorem.

e) If X and Y are two discrete random variables then, prove that

   Var (aX + bY) = a² Var (X) + b² Var (Y) + 2ab Cov (X, Y), where a and b are real constants.

f) State axioms of probability. For an event A defined on Ω, prove that P (A') = 1 – P (A).

Q3) Attempt <u>any four</u> of the following :   **[4 × 4 = 16]**

a) Let A, B, C be three events defined on Ω such that

   P (A) = 0.3, P (B) = 0.2, P (C) = 0.5, P (A $\cap$ C) = 0 = P (B $\cap$ C),

   P (A $\cap$ B) = 0.17.

   Calculate :

   i)   P (A $\cup$ B $\cup$ C).

   ii)   P (A' $\cap$ B' $\cap$ C').

b) A bag contains 4 tickets numbered 446, 464, 644 and 666. One ticket is drawn randomly. Let A_i (i = 1, 2, 3) be the event that the ith digit of the number of the ticket is 4. Discuss independence of the events A_1, A_2, A_3.

c) Following is the probability distribution of a discrete r.v.X.

X	1	2	3	4	5
P [X = x]	3k	5k	2k	k	k

Find

i)   The value of k,
ii) P [X is even],
iii) Mode,
iv) E (X).

d) Define cumulative distribution function of a discrete r.v. and state any two properties of it.

e) The p.m.f of a.r.v. X is

$$P(X=x) = \frac{x+2}{25}, \text{for x} = 1,2,3,4,5.$$
$$= 0, \quad \text{otherwise}$$

Find E (X) and V (X). Using these results find the values of

i)   V (– 3X + 4).

ii) S.D.$\left(\dfrac{10+X}{2}\right)$

f) Let $X \to B(n_1, p)$; $Y \to B(n_2, p)$, if X and Y are independent. Find the conditional probability distribution of X given X + Y = n. Identify the distribution.

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

a) i)   Define :

1)   A bivariate discrete r.v. and
2)   Joint probability mass function of (X, Y).

ii) The probability distribution of a discrete r.v.X is given below :

X	0	1	2	3
P [X = x]	0.1	0.3	0.4	0.2

Find the third central moment μ_3. Also comment on the nature of the distribution.

b) Let (X, Y) be a bivariate r.v. with the following joint p.m.f.

(x, y)	(0, – 1)	(0, 1)	(1, – 1)	(1, 1)
P (x, y)	2/25	3/25	8/25	12/25

Find
i)   E (X) and E (Y),
ii) V (X) and V (Y),
iii) Cov (X, Y) and
iv) Correlation coefficient between X and Y.

c) Let X → B (n, p). Obtain the mean and variance of X. Show that Var (X) < E (X).

d) i)   Let X → P (m). If P (X = 2) = P (X = 1), find P (X ≥ 4).
   ii) Find recurrence relation between the probabilities of Poisson distribution with parameter m.

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

a) Define a discrete uniform probability distribution. Give one real life situation where it is applicable. Also, compute γ_1 for a discrete uniform r.v. and comment upon its value.

b) i)   Show that all raw moments of a Bernoulli (p) r.v. are equal to 'p'.
   ii) If X and Y are independent binomial variates with X → B (5, 1/2) and Y → B (8, 1/2).

   Find $P\left(\dfrac{x+y}{2} \geq 1\right)$

c) Define Hypergeometric distribution. Give one real life situation where it can be used. Also obtain its mean.

d) The joint p.m.f. of (X, Y) is $P(x, y) = \dfrac{2x+3y}{72}$,   x = 0,1, 2;

                                                    y = 1, 2, 3
                                    = 0,   otherwise

Find :
i)   Marginal p.m. fs of X and Y.
ii) Are X and Y independent? Justify.
iii) Conditional p.m.f of Y given X = 1,
iv) E (X/Y = 1).

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[4317] - 3
F.Y. B.Sc.
PHYSICS - I
Mechanics, Heat and Thermodynamics
(Paper - I) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates :

1) *All questions are compulsory.*
2) *Figures to the right indicates full marks.*
3) *Use of log table and calculator is allowed.*
4) *Neat diagram must be drawn wherever necessary.*

Q1) Attempt all of the following :

a) What is difference between mass and weight? **[2]**

b) The initial velocity of the body is 16 m/s. What is its velocity after 2.5 sec if it accelerate uniformly at 4.5 m/s^2. **[2]**

c) Give any two applications of surface tension. **[2]**

d) Write the statement of Bernoulli's theorem. **[2]**

e) State first law of thermodynamics. **[2]**

f) Calculate the coefficient of performance of Carnot's refrigerator working between the temperatures 127ºC and 27ºC. **[2]**

g) What are the advantages of mercury thermometer? **[2]**

h) Define isobaric and isochoric changes. **[2]**

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

a) Describe the Jaeger's method to determine surface tension of a liquid.**[4]**

b) What is average acceleration? Interpreat average acceleration using v - t graph in one dimensional motion. **[4]**

c) What is pseudo force? Illustrate with examples. **[4]**

d) What force is required to accelerate 2000kg car from 10 m/s to 40 m/s in time of 10 sec. **[4]**

e) Water flowing in a horizontal pipe has a speed 40cm/s at one end point and 30cm/s at another point. Determine the pressure drop between two points. **[4]**

f) A metal cube of side 6cm and relative density 8kg/m^3 is suspended by a string so as to be completely immersed in a liquid of density 1.2 × 10^3 kg/m^3. Find the tension in the string. **[4]**

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

a) Prove that slope of adiabatic curve through a point in P-V diagram is γ times the slope of the isothermal curve through the same point. **[4]**

b) Show that the entropy remains constant during a reversible cyclic change. **[4]**

c) What is Boyle's temperature? Obtain the relation between Boyle temperature and critical temperature. **[4]**

d) Find the temperature in Fahrenheit scale, Kelvin scale and Reaumur scale corresponding to 45°C. **[4]**

e) The expansion ratio and compression ratio are 6 and 12 respectively. If the value of γ is 1.4 for the working substance in a Diesel engine. Find its efficiency. **[4]**

f) A reversible engine converts 1/8th of heat into work. When temperature of the sink is decreased by 62°K, its efficiency is doubled. Find the temperature of the source. **[4]**

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

a) State the working principle of venturimeter and discuss in detail the working of venturimeter. **[8]**

b) i) A position of particle along x - axis with time is given by $x(t) = 7 + 5t + 8t^2$ where x in meter.

　　1) Find the average velocity between $t = 0$ and $t = 1$sec.

　　2) Find the value of acceleration at $t = 0.5$ and $t = 1$sec. **[4]**

　ii) State the principle of conservation of energy and show that the total mechanical energy remain constant. **[4]**

c) i) Calculate the work done in moving a particle along a vector $\vec{r} = (3\vec{i} - \vec{j} + 6\vec{k})$ meter, if the applied force is $\vec{F} = (\vec{i} + 3\vec{j} + 2\vec{k})$ Newton. **[4]**

　ii) Obtain the equation of continuity. **[4]**

Q5) Attempt <u>any two</u> of the following :

a) Describe Carnot's heat engine. Obtain an expression for its efficiency. **[8]**

b) i) Calculate the work done when a gram molecule of a gas expands isothermally at 37°C to double its original volume (R = 8.3 joule/ degree/mole). **[4]**

　ii) Derive reduced equation of state from van-der-waals equation of state. **[4]**

c) i) Calculate the van-der-waal's constant 'a' and 'b' for dry air given that $T_c = 132$°K, $P_c = 37.2$ atmp. and R = 82.07 cm³.atmp/°K. **[4]**

　ii) Explain construction and working of liquid filled thermometer. **[4]**

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[4317] - 6
F.Y. B.Sc.
CHEMISTRY - II
Organic and Inorganic Chemistry
(Paper - II) (2008 Pattern) (Theory)

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) Why is staggered conformation more stable than eclipsed conformation?

b) Give applications of organic compounds in our daily life.

c) Ethyl alcohol is water soluble but n-butyl alcohol is water insoluble. Explain.

d) Maleic acid undergoes cyclisation at low temperature but fumaric acid does not. Explain.

e) Benzene does not undergoes addition reactions. Explain.

f) What is oxidation number of
   i)   P in $(P_2 O_7)^{4-}$
   ii)   S in $(S_4 O_6)^{2-}$

g) Alkali metals do not show +2 oxidation state. Explain.

h) Draw the structures of following :
   i) XeO_2F_2
   ii) $[X_eO_6]^{4-}$

Q2) a) Attempt <u>any two</u> of the following :   **[8]**

   i)   Discuss the acidic nature of phenol. Give any two reactions of phenol.

   ii)   What is Resonance effect? Explain +R and –R effects with suitable examples.

   iii)   Explain isomerism. Give classification of structural isomerism with examples.

b) Attempt <u>any two</u> of the following : **[8]**

i) What are ethers? How are they classified? Give any two methods for the preparation of ether.

ii) What is an electrophilic substitution reaction? Explain nitration of benzene.

iii) What is difference between combustion and pyrolysis?

Q3) a) Answer <u>any two</u> of the following : **[8]**

i) How is ethyl methyl ether prepared from -

1) Diazomethane

2) Ethyl chloride? What is action of cold HI on it?

ii) What is inductive effect? Chloroacetic acid is stronger acid than acetic acid. Explain.

iii) Assign E and Z configuration of following compounds.

A) $CH_3-CH_2 \diagdown C=C \diagup CH_3$ Ph $\diagup$ $\diagdown OH$ B) $Br \diagdown C=C \diagup C_2H_5$ $CH_3 \diagup$ $\diagdown H$
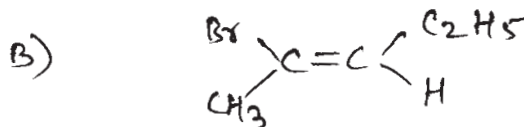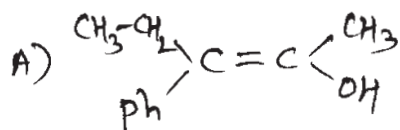
iv) What are alkynes? How will you prepare alkynes starting from

A) Vicinal dihalides.

B) Higher alkynes from acetylene.

b) Attempt <u>any two</u> of the following : **[8]**

i) What are alkyl halides? How are they classified? How is ethyl bromide prepared from ethylene?

ii) What is steric effect? Explain with suitable examples.

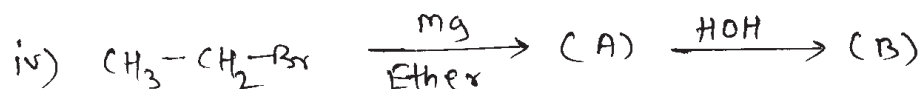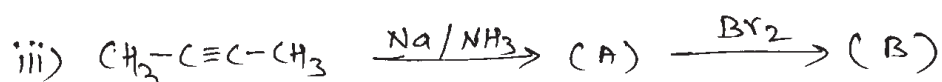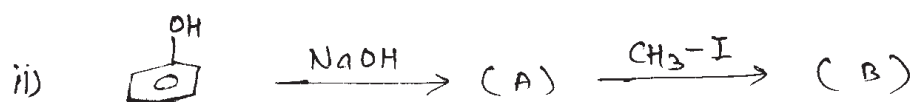iii) Write short notes on :

A) Optical activity.

B) Peroxide effect.

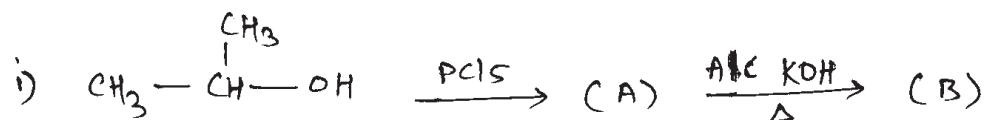**Q4)** a) Attempt <u>any three</u> of the following : **[6]**

i) Draw all possible isomers of the compound having molecular formula C_3H_8O.

ii) Define the following :

A) Covalent bond.

B) Intramolecular forces.

iii) Draw the structures for the following compounds.

A) 2 - bromo - 3 - chloro - pentane.

B) 2, 3 - dimethyl butane.

iv) Assign R or S configuration of following compound.

$$CH_3 - \overset{\overset{\displaystyle C_2H_5}{|}}{\underset{\underset{\displaystyle F}{|}}{C}} - Cl$$
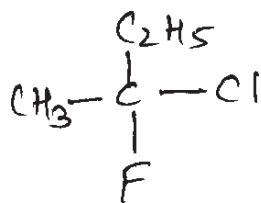
b) Identify the products A and B and rewrite the reactions (any two) : **[4]**

i) $CH_3 - \overset{\overset{\displaystyle CH_3}{|}}{CH} - OH \xrightarrow{PCl_5} (A) \xrightarrow[\Delta]{Alc\ KOH} (B)$

ii) (cyclohexanol/phenol with OH) $\xrightarrow{NaOH} (A) \xrightarrow{CH_3-I} (B)$

iii) $CH_3 - C \equiv C - CH_3 \xrightarrow{Na/NH_3} (A) \xrightarrow{Br_2} (B)$

iv) $CH_3 - CH_2 - Br \xrightarrow[Ether]{mg} (A) \xrightarrow{HOH} (B)$

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

i) Draw the skeleton of the long form of periodic table and show the position of following in it.

A) Alkaline earth metal.

B) Second transition series.

C) Fluorine.

D) Most electropositive element.

E) d-block elements.

F) Zero group element.

ii) Explain the diagonal relationship between lithium and magnesium.

Q5) a) Attempt <u>any two</u> of the following : [6]

   i) Calculate the screening constant 'S' and Z* for the valence electron of oxygen (Z = 8).

   ii) Give the names and write electronic configuration of group - I A elements.

   iii) Write a note on position of noble gases in the periodic table.

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

   i) Discuss the bonding and shape of

   A) XeO_4

   B) $XeOF_4$

   ii) What are the application of alkali metals and their compounds?

   iii) Describe the separation of alkali metals using crown ethers.

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[4317] - 7
F.Y. B.Sc.
BOTANY - I
Plant Diversity
(Paper - I) (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 are ephemerals?

   b) Give any two types of unicellular algae.

   c) Give any two methods of vegetative reproduction in fungi.

   d) Mention any two thallus structures of lichens.

   e) Write any two characters of mosses.

   f) Write any two methods of vegetative reproduction in pteridophytes.

   g) Give any two characters of gymnosperms.

   h) Define placentation.

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

   a) Explain the concept of plant diversity.

   b) Describe thallus diversity in algae.

   c) Describe vegetative reproduction in <u>cystopus</u>.

   d) Explain the organisation and structure of sporophyte in mosses.

   e) Define flower. Describe parts of typical flower.

   f) Describe sexual reproduction in pteridophytes.

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

   a) Sporophyte diversity in cycadales and ginkgoales.

   b) In-situ conservation of plant diversity.

   c) Adhesion of stamens.

   d) Internal thallus diversity in lichens.

   e) Occurrence of bryophytes.

   f) Male and female cones of Gnetales.

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

   a) Describe thallus diversity in fungi.

   b) What is calyx? Explain various modifications of calyx.

   c) Describe mode of nutrition in fungi.

   d) What is androecium? Describe cohesion of stamens.

Q5) Describe life cycle pattern in <u>Cystopus</u>.   **[16]**

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

Sketch, label and describe any four types of racemose inflorescence.

<div align="center">☒☒☒☒</div>

[4317] - 8

F.Y. B.Sc.

BOTANY

Plant Resources - Management and Utilization

(Paper - II) (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)   Write two uses of weeds.

    b)   Write two uses of rubber.

    c)   Write botanical names of two medicinal plants.

    d)   What is green house?

    e)   Write names of two plants used in flower arrangement.

    f)   Name two untapped plant resources.

    g)   Define bioprospecting.

    h)   Give two examples of fuel yielding plants.

Q2)   Answer <u>any four</u> of the following :   **[16]**

    a)   Describe methods of seed selection.

    b)   Write preparation of squash.

    c)   Describe sprinkler irrigation method.

    d)   Give uses of sea weeds as fodder.

    e)   Write source and uses of resin.

    f)   Give applications of phytoremediation.

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

    a) Honey.

    b) Gum.

    c) Corm.

    d) Phytovolatilization.

    e) Maceration.

    f) Limitations of green house technology.

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

    a) What is budding? Describe 'T' budding.

    b) Describe chemical method of weed control.

    c) Describe <u>Aloe</u> with reference to botanical name, part used, products and uses.

    d) Describe any four types of formal flower arrangement.

Q5) What is post harvest technology? Describe methods of grading and processing used for fruits and flowers.   **[16]**

OR

Define biocontrol. Describe source, preparation and uses of pyrethrins and <u>Trichoderma</u>.

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[4317] - 9
F.Y. B.Sc.
ZOOLOGY
ZY - 101 : Nonchordates and Chordates
(2008 Pattern) (Paper - I) (Theory)

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
(Nonchordates)

Q1) Define/Explain (any ten) :   **[10]**

   a) Aquaculture.
   b) Systematics.
   c) Vermiculture.
   d) Holozoic nutrition.
   e) Cytostome.
   f) Oligochaeta.
   g) Rejuvenation.
   h) Gastrozooid.
   i) Radial symmetry.
   j) Arthropoda.
   k) Species.
   l) Bioluminescence.

Q2) Write short notes on (any three) :   **[15]**

   a) Physiology.
   b) Conjugation in <u>Paramoecium</u>.
   c) General characters of class calcarea.
   d) Significance of coral reef.
   e) General organization of phylum platyhelminthes.

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

   a) Mention the general characters of Echinodermata.
   b) Describe Batesian mimicry in butterflies.
   c) Give general characters of Animalia.

P.T.O.

OR

Mention the distinguishing characters and classification of Phylum Protista.
Give suitable examples and characters of any three subphyla. **[15]**

SECTION - II
(Chordates)

Q4) Define/Explain (any ten) : **[10]**

a) Vertebrata.

b) Cephalochordata.

c) Anadromous migration.

d) Monotremes.

e) Floating posture in Frog.

f) Hibernation.

g) Camouflage.

h) Nictitating membrane.

i) Bile.

j) Sanguivorous.

k) Portal system.

l) Granulocytes.

Q5) Write short notes on (any three) : **[15]**

a) Economic importance of fishes.

b) Terrestrial adaptations in reptiles.

c) Diversity in aquatic plasental mammals.

d) Cutaneous respiration in frog.

e) Marsupial mammals.

Q6) Attempt the following : **[15]**

a) Give general characters of subphylum urochordata.

b) Sketch and label dorsal view of brain in frog.

c) Mention general characters of cyclostomata.

OR

Describe the sexual dimorphism in frog. Explain in detail the male urinogenital
system of frog.

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[4317] - 10
F.Y. B.Sc.
ZOOLOGY (Theory)
ZY - 102 : Genetics and Parasitology
(2008 Pattern) (Paper - II)

Time : 3 Hours]   *[Max. Marks : 80*

Instructions to candidates :

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

SECTION - I
(Genetics)

Q1) Define/Explain the following (any ten) :   **[10]**

a) Factor.

b) Dominance.

c) Epistasis.

d) Multiple genes.

e) Eugenics.

f) Colour blindness.

g) Test cross.

h) Lethal genes.

i) Holandric genes.

j) RNA.

k) Genetics.

l) Recombinant DNA.

Q2) Write short notes (any three) :   **[15]**

a) Erythroblastosis foetalis.

b) Kappa particles in <u>Paramoecium</u>.

c) Turner's syndrome.

d) Alkaptonuria.

e) Gene Therapy.

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

    a) Explain with suitable example the gene interaction in the 15 : 1 ratio.

    b) Describe the method of sex determination in honeybees.

    c) In Corn Plants a dominant allele 'I' inhibits the Kernel colour making the corn Kernel white. Gene 'i' is recessive and permits colour when homozygous. At a different locus, the dominant gene 'P' causes purple Kernel colour, while homozygous recessive genotype 'PP' causes Kernels red. If the plants heterozygous at both the loci are crossed, what will be the phenotypic ratio of F_1 generation? Comment on the phenotypic ratio of this cross.

OR

Q3) Describe the morphology and ultrastructure of chromosome and add a note on its chemical composition. **[15]**

SECTION - II
(Parasitology)

Q4) Define/Explain the following (any ten) : **[10]**

    a) Medical protozoology.

    b) Mutualism.

    c) Host-specificity.

    d) Accidental parasite.

    e) Inflammation.

    f) Amoebiasis.

    g) Toxoplasmosis.

    h) Trophozoite.

    i) Hermaphroditism.

    j) Permanent parasite.

    k) Prophylaxis.

    l) Sanguivorous.

Q5) Write short notes on (any three) : **[15]**

    a) Pathogenicity of Pediculus humanus.

    b) Commensalism

    c) Treatment and control of Sarcoptes scabei.

    d) Control measures of Ascaris lumbricoides.

    e) Symptoms of malaria.

Q6) Attempt the following : **[15]**

a) Define the term host, describe any two types of host with suitable examples.

b) Parasitological significance of Bird flu.

c) Mention any five ectoparasitic adaptations with suitable examples.

OR

Q6) Describe the life-cycle of <u>Taenia solium</u> and add a note on its pathogenicity and control measures. **[15]**

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[4317] - 11

F.Y. B.Sc.

GEOLOGY

Mineralogy and Petrology

(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 mineral.

   b)   What is atmophile?

   c)   What is thermal metamorphism?

   d)   What is sill?

   e)   Define extinction.

   f)   What is magma?

   g)   Define pseudomorphism.

   h)   What is anisotropism?

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

   a)   Give an account of minerals used in cement industry.

   b)   Explain the radioactive properties of minerals.

   c)   Explain the vander waals bonding in minerals with suitable examples.

   d)   Describe the sorosilicate structure with suitable examples.

   e)   Differentiate between petrological and other microscope.

   f)   Explain the process of oxidation and supergene enrichment in the formation of mineral.

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

　　a) Explain residual deposits with suitable examples.

　　b) Explain Bowen's reaction series.

　　c) Describe the texture of conglomerate and limestone.

　　d) Explain the granulose structure in metamorphic rocks.

　　e) Describe the agents of metamorphism.

　　f) Explain porphyritic texture seen in Igneous rocks.

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

　　a) Give the silicate structure, chemical composition, physical and optical properties of 'Orthoclase'.

　　b) Explain the following structures of Igneous rocks.

　　　　i)　Vesicular structure.
　　　　ii)　Columnar jointing.

　　c) Explain the construction and working of Nicol's prism.

　　d) Explain the graded bedding and ripple mark structure in sedimentary rocks.

Q5) Give the elements of symmetry, Crystallographic axes, definition with indices of various forms present in Cubic system, type Galena. **[16]**

OR

　　a) What is specific gravity? Explain Walker's steelyard balance in the determination of specific gravity of minerals.

　　b) Explain the cataclastic and dynamothermal metamorphism in metamorptic rocks.

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[4317] - 12
F.Y. B.Sc.
GEOLOGY - II
General Geology and Palaeontology
(2008 Pattern) (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.*

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

    a) What are Potholes?

    b) What are Imprints?

    c) Draw a neat labelled diagram of a typical Brachiopod Shell.

    d) Give the geographical distribution of lamelli branchs.

    e) Give the size and shape of the Earth.

    f) Give any two uses of fossils.

    g) What are Drumlins?

    h) What are Barchans?

Q2) Answer <u>any four</u> questions from the following :   **[16]**

    a) Define weathering. Explain soil profile.

    b) Describe the morphology of Head/Cephalon of Trilobite.

    c) Describe Residual and Fold type of mountains.

    d) Draw diagrams to show the various forms in Gastropod shells (any four).

    e) Define Earthquake. Explain the terms focus, epicentre and isoseismal line.

    f) Describe different type of deltas formed by the action of rivers.

P.T.O.

Q3) Answer <u>any four</u> questions from the following : **[16]**

a) Explain the techniques used in collection of fossils.

b) Describe the internal structure of the earth.

c) Define Palaeontology. Describe its branches.

d) Describe the structure of the Atmosphere.

e) With neat diagrams explain the different type of suture lines in Ammonoids.

f) Explain the different seismic waves generated during an Earthquake.

Q4) Answer <u>any two</u> questions from the following : **[16]**

a) Describe the sea cliff and wave cut platform formed by the action of sea.

b) Distinguish between Regular and Irregular Echinoids with the help of diagrams.

c) Explain the origin of the universe with the help of Big Bang Theory.

d) Describe with the help of neat labelled diagram the morphology of a Nautilus Shell.

Q5) Describe the hard part morphology of a typical lamellibranch shell. Add a note on type of hingelines. **[16]**

OR

a) Explain the concept of continental drift. **[8]**

b) Describe the structure of a typical central type of volcano. **[8]**

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[4317] - 15
F.Y. B.Sc.
GEOGRAPHY
Gg - 110 : Physical Geography - I
(2008 Pattern) (Paper - I)

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 in 2 - 4 sentences :

　　a)　What is mantle?

　　b)　What are Sedimentary rocks?

　　c)　What is an Arête?

　　d)　What are 'S' waves?

　　e)　What are Ox - bow lakes?

　　f)　What is Backshore?

　　g)　What is a Mushroom rock?

　　h)　What are diastrophic movements?

Q2) Explain the following in brief (any four) :

　　a)　Periods and systems of Mesozoic era.

　　b)　Characteristics of Metamorphic rocks.

　　c)　Define geomorphology and give its major branches.

　　d)　Zuegens and Yardangs.

　　e)　Chemical weathering.

　　f)　Meandering of rivers.

Q3) Answer the following (any four) :

a) What is the difference between metallic and non-metallic minerals?

b) Give the Major earthquake regions of the world.

c) Discuss : Horst and Graben.

d) How are waves formed?

e) Discuss the Davison concept of Cycle of Erosion.

f) Discuss the types of physical erosion?

Q4) Answer the following (any two) :

a) Discuss the depositional features of glacial erosion in detail.

b) Explain the composition of the interior of the earth.

c) Discuss the different types of plutonic rocks.

d) Explain erosional landforms produced by sea waves.

Q5) What are crustal plates? Discuss the different plate margins and associated landforms.

OR

Describe the landforms created by river erosion.

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