Total No. of Questions : 5]

SEAT No. : ____

P136

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[5422] - 1

F.Y.B.Sc.

MATHEMATICS

MT- 101:Algebra and Geometry

(2013 Pattern) (Paper - I)

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

Instructions to the candidates:

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

Q1) Attempt any eight of the following: **[16]**

a) Let *a*, *b* be integers. If *a*/*b* and *b*/*a* then show that $a = \pm b$.

b) Let A = {1, 2, 3, 4, 5, 6}. Define a relation R on A by R = $\{ (i, j) / |i - j| = 2\}$ IS R

i) Symmetric

ii) Transitive

c) Let $f(x) = x^3 - 8$ and $g(x) = x^2 + 2x + 4$ find $q(x), r(x) \in R[x]$ such that $f(x) = g(x)\, q(x) + r(x)$.

d) Define row echelon form of a matrix.

e) Define Euler's ϕ function. Hence find ϕ (10).

f) Find the angle 'θ' through which the axes should be rotated so that the equation $3x^2 + 2xy + 3y^2 - 4x + 2y + 1 = 0$ is free from the product term.

g) Find the equation of the plane which passes through the point (1, – 3, – 4) and is parallel to the plane $6x + 2y - 3z = 5$.

h) If α, β, γ are the direction angles of a line then show that $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 2$.

i) Find the equation of the sphere whose centre is (2, –3, –1) and radius is 4.

j) Define right circular cylinder.

P.T.O.

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

a) By using principle of mathematical induction prove that $n < 2^n$ for all positive integers n.

b) Prove that any two equivalence classes are either disjoint or identical.

c) Let $p(x), q(x), r(x)$ be polynomials in R[x] with $p(x) \neq 0$. If $p(x) \mid q(x),\ p(x) \mid r(x)$ then show that $p(x) \mid m(x)q(x) + n(x)r(x)$ where $m(x), n(x)$ are polynomials in R[x].

d) Examine the consistency of the system and if consistent solve it $x + y + z = 6,\ x + 2y + 3z = 10,\ x + 2y + 4z = 10$.

e) Find g.c.d. of 7234 and 3476. Also find integers x, y such that (7234, 3476) = 7234 x + 3476 y.

f) Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 0 & 2 & 1 \\ -1 & 2 & 2 \end{bmatrix}$.

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

a) State and prove division algorithm for integers.

b) i) Solve $27x^3 + 42x^2 - 28x - 8 = 0;$ given that the roots are in G.P.

ii) Verify the Cayley - Hamilton theorem for the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 2 & 3 & 2 \\ 3 & 3 & 4 \end{bmatrix}$.

c) i) Find all possible solutions of the system given below

$2x - y + 3z = 1,\ 3x + 2y + z = 3,\ x - 4y + 5z = -1$.

ii) Prepare addition and multiplication tables for Z_6. Find multiplicative inverse of elements in Z_6 if exists.

Q4) Attempt any four 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) Obtain the equation of a plane in the normal form.

c) Find the locus of a point whose distance from the origin is 7 times its distance from the plane $2x + 3y - 6z = 2$.

d) Find the distance of (–1, 2, 5) from the line through (3, 4, 5) having d.c.s. are proportional to 2, –3, 6.

e) Find the equation of the sphere passing through the circle $x^2 + y^2 + z^2 = 9, 2x + 3y + 4z = 5$ and the point (1, 2, 3).

f) Find the equation of a cone having vertex at (2, 1, 0) and the guiding curve $y = 0$, $x^2 + z^2 = 9$.

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

a) Reduce the equation $7x^2 - 6xy + 7y^2 + 30x + 10y + 35 = 0$ to the standard form and name the conic.

b) i) Find equation of the sphere described on the line joining the points $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ as a diameter.

ii) Find the equation of the planes bisecting the angles between the planes $3x - 6y + 2z + 5 = 0$ and $4x - 12y + 3z = 3$.

c) i) Find the shortest distance for the following pair of lines

$$\frac{x-3}{5} = \frac{4-1}{-7} = \frac{z-2}{3} \text{ and } \frac{x-2}{1} = \frac{y-3}{-2} = \frac{z+1}{1}.$$

ii) Find the equation of a right circular cylinder whose axis is the line $\frac{x-\alpha}{l} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$ where l, m, n are d.r.s. of the line and r is radius of the cylinder.

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Total No. of Questions : 5]

SEAT No : ____

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[5422]-10
F.Y.B.Sc.
ZOOLOGY
ZY - 102 : Fundamentals of Cell Biology and Genetics
(2013 Pattern) (Theory) (Paper-II)

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

Instructions to the candidates:

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

Q1) Define/Explain the following: **[16]**

a) Vital Stain.

b) Cell.

c) Glyoxysomes.

d) Chemoreceptors.

e) Phenotype.

f) Recessive lethal genes.

g) Kappa particles.

h) Genetics.

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

a) Eukaryotic cell.

b) Telophase of mitosis.

c) Prophase-I of meiosis.

d) Law of independent assortment.

e) Duplicate factor (15:1).

f) Eugenics.

P.T.O.

Q3) Attempt the following (Any four): **[16]**

a) What is a stain? Write a note on 'cytoplasmic stain'.

b) Distinguish between mitosis and meiosis.

c) Explain inhibitory factors (13:3 ratio) with suitable example.

d) Explain the inheritance of colourblindness in human.

e) Describe polygenic inheritance in human.

f) Describe the functions of endoplasmic reticulum.

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

a) Describe chemical composition of cell membrane.

b) Describe structure of the nuclear envelope. Add a note on functions of nucleus.

c) Give an account of 'klinefelter's syndrome'.

d) What are multiple alleles? Explain it with 'ABO' blood group system in man.

Q5) Describe types of lysosomes. Write a note on its functions. **[16]**

OR

a) Give an account of deletion and inversion in chromosomes. **[8]**

b) Describe "XX-XO" method of sex determination. **[8]**

Total No. of Questions : 5]

SEAT No. :

P146

[Total No. of Pages : 2

[5422]-11
F.Y. B.Sc.
GEOLOGY
MINERALOGY AND PETROLOGY
(2013 Pattern) (Revised Course) (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.***
3) ***Neat labelled diagrams must be drawn wherever necessary.***

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

a) What are synclines?
b) Define lustre in minerals.
c) Define the terms Petrology and Petrography.
d) What are atoms and Ions?
e) Give the classification of Igneous rocks based on Silica Percentage.
f) What is Tectosilicate structure?
g) What are isotropic minerals?
h) Draw diagram to show terms associated with faults.

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

a) What are Joints? Explain Columnar joints.
b) Explain any two processes of mineral formation.
c) What are sedimentary Rocks? Add a note on Sedimentary Environments.
d) Explain the construction and working of Nicol Prism.
e) Describe clastic textures in Sedimentary rocks.
f) Explain the Walker's Steel Yard method of determining the specific gravity.

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

a) Describe the branches of Mineralogy.
b) Describe :
   i) Dykes ii) Sills
c) Explain the phenomenon of Isomorphism and Polymorphism in minerals.
d) Explain the construction of Clinometer Compass.
e) Explain the property of Hardness in minerals.
f) Define an unconformity. Explain Angular unconformity.

P.T.O.

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

a) Define metamorphism. Describe the various agents of metamorphism.

b) Define bonding in crystals. Explain ionic and covalent bonds.

c) Explain the utility of minerals in ceramic and cement industry.

d) Describe :

i) Ripple Marks

ii) Cross Bedding structures in Sedimentary rocks

Q5) Describe the crystallographic axes, elements of symmetry and forms present with their indices of Cubic System (Galena Type) **[16]**

OR

a) Describe the factors controlling textures in Igneous rocks. Explain Granitic texture. **[8]**

b) Mention the different kinds of metamorphism. Describe schistose and granulose structures in metamorphic rocks. **[8]**

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Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[5422]-12
F. Y. B. Sc.
GEOLOGY
Physical Geology and Palaeontology
(2013 Pattern) (Paper - II) (Revised)

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

Instructions to the candidates:

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

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

a) Define a volcano.

b) Give a list of equipments used in collection of fossil samples.

c) Give the periods of Mesozoic era.

d) What are residual/relict mountains?

e) Give the systematic position of Belemnites.

f) Describe any two branches of Geology.

g) Explain sinistral coiling in Gastropods.

h) Mention all the branches of Palaeontology.

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

a) Describe the various suturelines in Ammonoids.

b) Describe

i) Stacks ii) Mushroom rock

c) Describe the various septa seen in corals.

d) Explain the concept of Plate Tectonic Theory.

e) Describe the life during Mesozoic era.

f) Define an Earthquake. Explain the various causes of earthquakes.

P.T.O.

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

a) Explain Airy's Model of Isostacy.

b) Describe any four forms shown by Eastroped shells.

c) Explain the Big Bang theory for the origin of the universe.

d) Explain the conditions necessary for fossilization.

e) Describe the hinge lines in Lamellibranch.

f) Describe

i) Waterfalls ii) Meraines.

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

a) Describe the hard part morphology of the Head/Cephalon of Trilobite.

b) Explain the processes of chemical weathering.

c) What are disasters? Explain the types and effects of disasters.

d) Define a fossil. Describe Imprints and cost and moulds modes of preservation of fossils.

Q5) Give the systematic position and describe the morphology of the hard parts of a typical Regular Echinoid. **[16]**

OR

a) Describe the internal structure of the Earth. **[8]**

b) Explain determination of age by K/Ar and Carbon dating methods. **[8]**

Total No. of Questions : 5]

SEAT No. :

P148

[Total No. of Pages : 4

[5422]-13
F.Y. B.Sc.
STATISTICS/STATISTICAL TECHNIQUES
Descriptive Statistics
(2013 Pattern) (Paper - I)

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

Instructions to the candidates:

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

Q1) Attempt each of the following : **[1 each]**

a) i) Explain the term 'Sample'.

ii) State the relation between quartiles for positively skewed data.

iii) State ultimate classes for data regarding objects related to two attributes A, B.

iv) For the regression model $\gamma = a + bx + \varepsilon$, if $\Sigma(x_i - \bar{x})(y_i - \bar{y}) = 10$, $\Sigma(x_i - \bar{x})^2 = 2$, find b.

b) Choose correct alternative for the following : **[1 each]**

i) When population is heterogeneous, then sampling method used is

A) SRSWR B) SRSWOR

C) Stratified sampling D) Cluster sampling.

ii) 'CSO' stands for

A) Central Standard office B) Central Statistical office

C) Control Standard office D) Control Statistical office

iii) The measurements on heights and weights are made on

A) nominal scale B) ordinal scale

C) interval scale D) ratio scale

iv) Mean deviation is minimum when deviations are taken from

A) mean B) median

C) mode D) first quartile

P.T.O.

c) i) Define

A) price index number

B) quantity index number **[2]**

ii) If $\sum_{1}^{10}(x_i - 10) = 0, \sum_{1}^{10}(x_i - 10)^2 = 100,$ Find standard deviation of X. **[2]**

iii) State one merit and one demerit of geometric mean. **[2]**

iv) Define mode. State the formula for mode for continuous data. **[2]**

Q2) Attempt Any Four of the following: **[4 each]**

a) Show that Bowley's coefficient of skewness lies between –1 and +1.

b) Compute variance for the following data :

x_i	–2	–1	0	1	2
f_i	a	$2a$	$3a$	$2a$	a

c) State requisites of a good measure of dispersion.

d) In a batch of 10 students, 3 failed in certain examination. The marks obtained by 7 successful candidates are :

77 87 40 52 82 70 50.

Find median of marks obtained by all 10 students.

e) If Cov (X, Y) = 6, then find

i) cov (X, – Y) ii) cov (X – 2, Y – 4)

iii) cov (3X, 4Y) iv) cov (X – 2, 4 – Y)

f) Raw moment of order 2 of 10 observations is 145. Later on if was found that one observation 30 was mis recorded as 13, find the corrected raw moment of order 2.

Q3) Attempt Any Four of the following:

a) Show that mean square deviation is minimum if deviations are measured from mean. **[4]**

b) Define the term "correlation". Draw scatter diagram for **[4]**

i) Positively correlated variables.

ii) Perfectly positively correlated variables.

c) For symmetric and mesokurtic distribution, find the first four raw moments, if mean = 1, variance = 4. **[4]**

d) Compute cov (X + Y, X – Y), if $\sigma_X = \sigma_Y$. **[4]**

e) Define "cost of living index number". State any two uses of cost of living index number. **[4]**

f) Compute combined variance for the following data. **[4]**

Group 1 : $\Sigma x_i = 10, \quad \Sigma x_i^2 = 40, \quad n_1 = 10$

Group 2 : $\Sigma y_i = 20, \quad \Sigma y_i^2 = 100, \quad n_2 = 20$

Q4) Attempt Any Two of the following :

a) i) With usual notations prove that $\beta_2 \geq 1$. **[4]**

ii) Check consistency of the following data : **[4]**

$$\mu_1' = 2, \mu_2' = 20, \mu_3' = 40, \mu_4' = 50.$$

b) In an examination, out of 100 students, 60 passed in physics, 52 passed in statistics, while 32 failed in both subjects. Find number of students

i) Failed in only one of the subjects. **[3]**

ii) Passed in either of the subjects. **[2]**

Also compute Yule's coefficient of association and comment on association between two attributes. **[3]**

c) i) Define "Skewness". Explain types of skewness with the help of box-plot. **[4]**

ii) Define "Kurtosis". State types of kurtosis. State relation between appropriate central moments for various types of kurtosis. **[4]**

d) Derive the expression for second degree curve Y on X using least square method. **[8]**

Q5) Attempt Any One of the following : **[2 each]**

a) i) Define the following terms with an example :

1) Positive class
2) Ultimate class
3) Independence of two attributes
4) dichotomous classification

ii) Find missing frequency for the following data if arithmetic mean is 50. **[8]**

C.I	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Frequency	12	x	55	35	18

Also compute mode.

b) i) Derive Spearman's rank correlation coefficient for bivariate data without ties. **[8]**

ii) Define r^{th} order central moment. Express fourth order central moment in terms of raw moments. **[4]**

iii) For a frequency distribution Karl Pearson's coefficient of skewness is − 0.6, mean is 70, standard deviation is 2. Find mode and median. **[4]**

Total No. of Questions : 5]

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P149

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[5422]-14

F. Y. B.Sc.

STATISTICS / STATISTICAL TECHNIQUES

Discrete Probability and Probability Distributions

(2013 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) Attempt each of the following :

a) i) Define a countably infinite sample space. **[1]**

ii) Define a degenerate distribution. **[1]**

iii) Give one real-life situation where Poisson distribution can be applied. **[1]**

iv) Let A and B be two independent events such that P(A)=0.40 and P(B)=0.25. Find the probability of simultaneous occurrence of the two events. **[1]**

b) Choose correct alternative for the following : **[1 each]**

i) Let A, B and C be any three events on a sample space Ω. Then only B occurs means,

A) $A \cup B \cap C$ B) $A' \cap B \cap C'$

C) $A \cap B' \cap C$ D) $A' \cup B \cup C'$

ii) A fair coin is tossed three times, then the probability of getting at least two tails is

A) $\frac{1}{4}$ B) $\frac{3}{4}$

C) $\frac{1}{2}$ D) 1

P.T.O.

iii) For a sample space $\Omega = \{w_1, w_2, w_3, w_4\}$, $P(w_1) = P(w_3) = \frac{1}{9}$, $P(w_2) = k$ and $P(w_4) = \frac{3}{9}$. For what value of 'k' will this be a probability model?

A) $\frac{5}{9}$ B) $\frac{4}{9}$

C) $\frac{3}{9}$ D) 0

iv) A r.v. $X \sim H(N,M,n)$. When $N \to \infty$ and $\frac{M}{N} = p$, the distribution of X is

A) B(N, p) B) B(n, q)

C) B(n, p) D) B(M, p)

c) i) State the multiplication theorem, for two events A and B defined on Ω. **[2]**

ii) Explain with an illustration what is meant by a Bernoulli trial. **[2]**

iii) Let $X \sim B\left(11, \frac{1}{2}\right)$. Find mode of X. **[2]**

iv) State Bayes' theorem. **[2]**

Q2) Attempt any four of the following : **[4 each]**

a) Define the following terms with an illustration :

i) random experiment

ii) probability of an event.

b) An integer is chosen at random from 1 to 100. What is the probability that the chosen integer is divisible by 17? What is the probability that the chosen integer is divisible by 17 but not divisible by 5?

c) Suppose Ω = {a, b, c, d, e, f, g, h} is a sample space with probability model as given below :

Sample point	a	b	c	d	e	f	g	h
Probability	0.05	0.10	0.15	0.16	0.12	0.12	0.15	0.15

If A = {a, b, d, e}, B = {b, c, e, g} be two events defined on Ω.

Find

i) $P(A \cup B)$ ii) $P(A')$

iii) $P(A \cap B)$ iv) $P(A|B)$

d) Define

i) Conditional probability of an event.

ii) Partition of the sample space.

e) A r.v. X has the following probability distribution :

X	–1	2	3	4
P[X = x]	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{1}{5}$	$\frac{1}{5}$

Find the probability distribution of Y = 3 X –1. Also find E(Y).

f) Give the classical definition of probability. State its limitations.

Q3) Attempt any four of the following : **[4 each]**

a) Define moment generating function (m.g.f.) of a r.v. X. State the uniqueness property of m.g.f.

b) Let X be a discrete r.v. with mean 5 and variance 4. Obtain $E(X^2)$ and $\text{Var}\left[\frac{X+1}{2}\right]$.

c) Define Bernoulli distribution with parameter p. Obtain μ'_3 for a Bernoulli r.v.

d) Obtain the mean and variance of a discrete uniform distribution with parameter 'n'.

e) Define geometric distribution. State its mean and give a situation where geometric distribution is applicable.

f) A random variable (X,Y) has joint probability distribution as follows :

X \ Y	0	1	2
0	$\frac{1}{4}$	0	$\frac{1}{4}$
1	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$
2	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$

Find :

i) Marginal probability distribution of X.

ii) Marginal probability distribution of Y.

iii) P[X+Y $\leq$ 2].

Q4) Attempt any two of the following :

a) i) Show that all the cumulants of Poisson distribution are equal to the parameter m. **[4]**

ii) Define **[4]**

1) the joint p.m.f. of a two-dimensional discrete r.v.

2) correlation coefficient between two r.v.s.

b) Obtain conditional mean and conditional variance of X given Y = 2 for the following joint probability distribution : **[8]**

X \ Y	1	2	3
0	0.3	0.2	0.1
1	0.2	0.1	0.1

c) i) If X and Y are independent random variables with the following distributions : **[4]**

X	5	10	15
P(X=x)	0.4	0.4	0.2

Y	1	2
P(Y=y)	0.4	0.6

Find the joint distribution of X and Y.

ii) For two discrete r.v.s X and Y, **[4]**

$$\text{Var}(X) = \text{Var}(Y) = 1,\ \text{Cov}(X,Y) = \frac{1}{2}$$

Find

1) Var (3X – 4Y) 2) $\rho\left(\frac{X+5}{2}, \frac{Y-6}{3}\right)$.

d) Let X and Y be two independent binomial variables with parameters (n_1=7, p=0.4) and (n_2=9, p=0.4) respectively.

Find

i) P[X + Y = 3] **[2]**

ii) P[X = 1 | X + Y = 7] **[3]**

iii) P[Y = 2 | X + Y = 8] **[3]**

Q5) Attempt any one of the following :

a) i) State the p.m.f. of a H(N, M, n) variable. Obtain its variance. **[5]**

ii) If the probability that a certain test yields a positive reaction is equal to 0.3. What is probability that less than 4 negative reactions occur before the first positive one. **[4]**

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

X	– 2	– 1	1	2
P[X = *x*]	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{6}$

Find third central moment μ_3. Also comment on the nature of the distribution. **[5]**

iv) State the additive property of Poisson distribution. **[2]**

b) i) A lot contains 14 items of which 5 are defective. Two items are drawn at random from the lot one after other without replacement. Find the probability that both items are non-defective. **[5]**

ii) Define cumulative distribution function and state its two important properties. **[4]**

iii) A r.v. (X, Y) has joint probability distribution as given below : **[7]**

X \ Y	2	3	4
1	$\frac{1}{6}$	0	$\frac{1}{12}$
2	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{6}$

Find

1) Cov(X, Y)

2) Cov(2X – 1, Y)

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[Total No. of Pages : 2

[5422] - 15

F.Y.B.Sc.

GEOGRAPHY - I

Gg- 110: Geomorphology

(2013 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) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of map stencils is allowed.***

Q1) Answer the following in twenty words (any eight) **[16]**

a) What is crust?

b) What is Gondwana land?

c) What is meant by focus of an earthquake?

d) Name any 2 (two) landforms associated with faults.

e) What does biological weathering mean?

f) What do you mean by a rockfall?

g) What is the meaning of erosion?

h) Give any two names of igneous and sedimentary rock each.

i) What is rapid crustal movement?

j) Scope of Geomorphology.

Q2) Explain the following in 150 words (Any four): **[16]**

a) Discontinuities in the interior of the earth.

b) Zone of compensation in the theory of Isostacy.

c) Factors affecting physical weathering.

d) Geological time scale.

e) Igneous rock.

f) Difference between ground moraines & terminal moraines.

P.T.O.

Q3) Answer the following in 150 words (any four): **[16]**

a) What are the major branches of physical Geography.

b) Write a note on the zones in the interior of the earth.

c) What are the constructive and destructive plate margins.

d) Discuss the types of metamorphism.

e) What is mass movement? Discuss slumps and fall.

f) Write a note on deposition as a geomorphic process.

Q4) Answer the following in 300 words (any two): **[16]**

a) Discuss any four volcanic landforms in detail.

b) What are faults? Discuss any three types of faults.

c) Write detailed note on the lower course of the river.

d) Discuss any six landforms of coastal erosion.

Q5) Answer the following in 500 words (any one): **[16]**

a) Explain with the help of neat diagram what are flood plains and their associated features.

OR

b) What are the factors affecting mass movement? Discuss the major type of Flow & Creep movements.

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Total No. of Questions : 5]

SEAT No. :

P151

[Total No. of Pages : 2

[5422]-16

F.Y.B.Sc.

GEOGRAPHY

Gg - 120 : Climatology and Oceanography

(2013 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 diagram wherever necessary.***
4) ***Use of map stencils is allowed.***

Q1) Answer the following in Twenty words(Any Eight) **[16]**

a) Define climate.

b) What do you mean by Inversion of temperature?

c) Define Monsoon?

d) What is meant by La-Nina?

e) Define Global Warming.

f) Define Oceanography.

g) Define coast.

h) What do you mean by salinity of ocean water?

i) What do you mean by wave refraction?

j) Give the types of tides.

P.T.O.

Q2) Explain the following in 150 words(Any Four) **[16]**

a) Discuss the Hydrological Cycle.

b) Any two factors affecting horizontal distribution of temperature.

c) Vertical distribution of pressure.

d) Causes of salinity.

e) Fiord coast.

f) Effects of ocean currents.

Q3) Answer the following in 150 words (Any Four) **[16]**

a) Ozonosphere

b) Types of Lapse rates.

c) Concept of pressure gradient.

d) Causes of ocean currents.

e) Ria coast.

f) Salinity of partially landlocked seas.

Q4) Answer the following in 300 words(Any Two) **[16]**

a) Discuss the importance of climatology in modern times.

b) Explain, the heat budget of the earth.

c) Withe the help of a neat diagram, explain the currents of the Atlantic ocean.

d) Discuss the composition of atmosphere.

Q5) Explain in details the different forms of precipitation. **[16]**

OR

Discuss the general idea of ocean relief in details.

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No : ____

P 152

[Total No. of Pages :2

[5422]-17
F.Y.B.Sc.
MICROBIOLOGY
Introduction to Microbiology
(2013 Pattern) (Theory) (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) Match the following:

i)	Watson and Crick	1)	Penicilin
ii)	Alexander Flemming	2)	Animalcules
		3)	DNA structure

b) Name two Gram positive bacteria.

c) Define acid. Give two examples.

d) Give two functions of Gas Vesicles.

e) Name the two purines in nucleic acids.

f) State true or false:

i) Proteins are made up of amino acids. _____

ii) Ester bond is present in lipids. _____

g) Fill in the blanks:

i) _____ is used in preparation of bioinoculants.

1)	Staphylococcus	2)	E.coli
3)	Rhizobium	4)	None of the above

ii) The cell theory was proposed by _____.

1)	Louis Pasteur	2)	Edward Jenner
3)	Robert Hooke	4)	None of the above

h) Name any two diseases caused by bacteria.

P.T.O.

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

a) Biocontrol Agents.

b) Germ theory of fermentation.

c) Ionic Bonds.

d) Industrial Microbiology

e) Bacterial Endospore.

f) Surgical Antisepsis.

Q3) Attempt Any Four of the following: **[16]**

a) State Koch's Postulates.

b) What are cell inclusions? Explain PHB granules.

c) Explain concept of Redox potential.

d) Explain ICTV classification of viruses.

e) Write about Micrographia of Antonyvon Leeuwoenhoek.

f) Describe the morphological characters of Bacteria.

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

a) What are lipids? Add a note on triglycerides.

b) What are Rickettsia? Give their morphological and differentiating characters.

c) What is Probiotics? Give the significance of Bacteria as probiotic cultures.

d) Explain Tyndall's experiment with a neat labelled diagram.

Q5) Attempt Any One of the following: **[16]**

a) With neat labelled diagram explain composition, structure and functions of bacterial cell wall.

b) What are carbohydrates? Give classification and functions of carbohydrates.

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Total No. of Questions : 5]

SEAT No. : ____

P153

[Total No. of Pages : 2

[5422]-18
F.Y. B.Sc.
MICROBIOLOGY
Basic Techniques in Microbiology
(2013 Pattern) (Paper - II)

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

Instructions to the candidates:

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

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

a) 1 lit = ... ml
   1 ml = ... ul

b) Define Growth rate.

c) Give two examples of mordants in staining.

d) Give two common ingradients of media.

e) Define - Diauxic growth.

f) What is phenol coefficient?

g) Match the following

A)	Death phase	i)	Decline phase
B)	Enumeration of baecteria	ii)	Neubeaur chamber
		iii)	Lag phase

h) State True or False

i) Safranin is a basic stain.

ii) Methylene blue is an acidic stain.

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

a) Explain radiations as physical mean of sterilization.

b) What are extremophiles? Explain a method to cultivate alkalophiles.

c) Explain role of mordants in staining.

d) Explain cell volume as a criterion to enumerate bacteria.

e) How is image formed in bright field compound microscope?

f) What are differential media? Elaborate with one example.

P.T.O.

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

a) What is disinfection? Explain mode of action of any one chemical disinfectant.

b) Write the principle and significance of negative staining.

c) What is a synchronous culture? Describe any two methods to obtain synchronous culture.

d) How are microorganisms classified on the basis of nutrition?

e) Describe - Chromatic abberrations.

f) Describe estimation of nitrogen as a method to enumerate bacteria.

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

a) Explain role of biological and chemical indicators to check efficiency of sterilization.

b) Explain functions and working of culture collection centre.

c) What is differential staining? Explain in detail with the help of an example.

d) Write a note on basic components of media.

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

a) Explain principle, construction, working and application of Dark field Microscope.

b) What is pure culture? Describe various methods to isolate bacteria.

Total No. of Questions : 5]

SEAT No. :

P154

[Total No. of Pages : 2

[5422]-19
F.Y. B.Sc.
EXPERIMENTAL PSYCHOLOGY
General Psychology
(2013 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.***
3) ***Neat labelled diagrams must be drawn wherever necessary.***

Q1) Answer in 20 words. (8 out of 10) **[16]**

a) What is Psychology?
b) State the full form of GABA.
c) Define motivation.
d) What is attention.
e) Define memory.
f) Define conflict.
g) Define emotion.
h) What is personality?
i) State the full name of S.P.M.
j) Define creativity.

Q2) Answer in 50 words. (4 out of 6) **[16]**

a) State the method of observation.
b) Explain the G.W. Allports approach of personality.
c) State the Canon Bord's theory of emotion.
d) Explain the fear as a basic emotion.
e) State the function of Thyroid gland.
f) Explain the sources of frustration.

Q3) Answer in 150 words. (4 out of 6) **[16]**

a) Explain the field of Educational Psychology.
b) Explain the nature of decision making.
c) Explain the importance of Thematic Appreception Test.
d) State the importance of Emotional Quitent.
e) State the theory of Span of Attention.
f) Explain the definition and nature of sensation.

P.T.O.

Q4) Answer in 300 words. (2 out of 4) **[16]**

a) Describe as a scientic method of Experimental Psychology.

b) Explain the misconception of personality.

c) Explain the types of mentally challenged.

d) Describe the structure and function of Neuron.

Q5) Answer in 500 words. (1 out of 2) **[16]**

a) What is learning? Explain the types of learning.

b) Define motivation. Describe the types of Biological motive.

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Total No. of Questions : 5]

SEAT No :

P 137

[Total No. of Pages : 3

[5422]-2
F.Y. B.Sc.
MATHEMATICS
MT-102 : Calculus and Differential Equations
(2013 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) Attempt any Eight of the following: **[16]**

a) Find supremum and infimum of the set $S=\left\{1,\frac{1}{2},\frac{1}{3},...,\frac{1}{n},...\right\}$.

b) Use $\lim_{x\to 0}\frac{\sin x}{x}$, to evaluate $\lim_{x\to 0}\frac{\sin 3x}{\sin 5x}$.

c) Define the derivative of the function $f(x)$ at $x=a$.

d) Show that the function $y=xe^{-x}$ satisfies the equation $x\frac{dy}{dx}=(1-x)y$

e) State Maclaurin's theorem with Lagrange's form of remainder.

f) Evaluate : $\int_0^{\pi/2}\cos^8 x\,dx$.

g) Define order and degree of the differential equation.

h) Find the integrating factor of the differential equation $\left(x^2+y^2+x\right)dx+xydy=0$

i) Define self orthogonal family.

j) Solve : $\sin(y-xp)=p$ where $p=\frac{dy}{dx}$

P.T.O.

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

a) If $\lim_{x\to a} f(x) = k$, then show that $\lim_{x\to a} |f(x)| = |k|$.

b) Let the function f : R $\to$ R be defined by

$f(x) = x\sin\frac{1}{x},\ x \neq 0$

$= 0,\ x = 0.$

Discuss the continuity of the function *f(x)* at point $x = 0$

c) State the Algebraic properties of R, the set of real numbers.

d) Show that if the function *f(x)* is derivable at $x=a$ then it is continuous at $x=a$. Is the converse true? Justify.

e) Verify Rolle's theorem for the function $f(x) = 9x^3 - 4x, x \in \left[-\frac{2}{3}, \frac{2}{3}\right]$.

f) Expand e^x in powers of $(x-1)$.

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

a) i) If x, y are real numbers then show that $|x+y| \leq |x| + |y|$

ii) Let f be a function defined in some deleted neighbourhood of point a. If $\lim_{x\to a} f(x)$ exists, then show that it is unique.

b) i) Discuss the continuity of the function $f(x) = \sqrt{x^2 - 2x}$

ii) Find the nth derivative of $x^3\cos x$.

c) i) State and prove Cauchy's mean value theorem.

ii) Evaluate : $\lim_{x\to 0} x^{\sin x}$

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

a) Evaluate : $\int \frac{2x+3}{(x+6)(x-5)}dx$

b) Solve the differential equation: $\frac{dy}{dx} = \frac{y^2}{xy - x^2}$

c) Explain the method of solving differential equation *f(x,y,p)=0* solvable for x where $p = \frac{dy}{dx}$.

d) Find the orthogonal trajectory of family of curves $y^2=4ax$ where a is parameter.

e) Explain the method of solving differential equation $\frac{dy}{dx}+Py=Q$ where P and Q are functions of x only.

f) Solve the differential equation: $\frac{dy}{dx}=\frac{x-y+3}{2x-2y+5}$

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

a) i) Solve the differential equation : $\left(\frac{dy}{dx}\right)^2-7\left(\frac{dy}{dx}\right)+10=0.$

ii) Solve the differential equation:

$$\left(x^2y^2+4xy+2\right)x\,dy+\left(x^2y^2+5xy+2\right)y\,dx=0$$

b) State and prove the necessary and sufficient condition for the differential equation Mdx+Ndy=0 to be exact.

c) If $I_n=\int \sin^n x\,dx,\ n\geq 2$ then prove that $I_n=\frac{-\cos x\sin^{n-1}x}{n}+\frac{(n-1)}{n}I_{n-2}$

Hence evaluate $\int_0^{\pi/2}\sin^6 x\,dx.$

Total No. of Questions : 5]

SEAT No. :

P155

[Total No. of Pages : 2

[5422]-20
F. Y. B. Sc.
PSYCHOLOGY
Experimental Psychology
(2013 Pattern) (Paper - II)

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

Instructions to the candidates:

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

Q1) Answer in 20 words (8 out of 10) : **[16]**

a) What is Experimental and control group?

b) Define Experiment.

c) Define Threshold

d) What is thinking?

e) Define learning.

f) State the full names of WAIS.

g) State the formula of IQ.

h) What is image.

i) Define fore period.

j) Define psychological test.

Q2) Answer in 50 words (4 out of 6) : **[16]**

a) Describe the test of Mechanical ability test.

b) State the factors influencing of learning.

c) State the application of clinical setting.

d) State the Fechner's law.

e) Describe the method of Trial and error.

f) State the Experiment on operant conditioning.

P.T.O.

Q3) Answer in 150 words (4 out of 6) : **[16]**

a) Explain the method of average error.

b) State the approaches of problem solving.

c) Explain the types of concept formation.

d) Explain in briefly Sentence Completion test. (SCT)

e) State the definition and nature of aptitude.

f) Write short note on Individual test.

Q4) Answer in 300 words. (2 out of 4) : **[16]**

a) Describe the goals of Experimental Psychology.

b) Explain the basic concept's of Psychophysics.

c) Explain the uses of psychological test.

d) Explain the types of learning.

Q5) Answer in 500 words. (1 out of 2) : **[16]**

a) What is variable? Explain the various types of variable.

b) Define Reaction time? Describe the determinants of Reaction time.

Total No. of Questions : 5]

SEAT No : ____

P156

[Total No. of Pages :3

[5422]-23
F.Y.B.Sc.
ELECTRONIC - SCIENCE
EL - 101 : Principles of Analog Electronics
(2013 Pattern) (Paper-I)

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

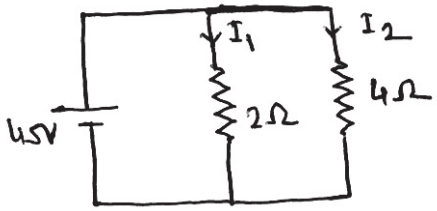
Instructions to the candidates:

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

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

a) Draw circuit symbols of LDR & TDR.

b) Determine currents I_1 & I_2 in the following circuit.



c) RC low pass filter is also called as integrator, comment.

d) Draw circuit symbols of Zener diode & p-n junction diode.

e) Sketch circuit diagram to study I-V characteristics of a Transistor in CE configuration.

f) Define saturation & cutoff points of a transistor with respect to load line.

g) Give circuit symbols of n channel & p-channel FET.

h) Define input offset current & input bias current of opamp.

P.T.O.

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

a) i) Explain in brief frequency response of a capacitor.

ii) Define inductance of a coil. Give circuit symbol of iron core inductor.

b) Explain working of RC low pass filter.

c) Describe construction & working of photodiode.

d) Compare CB & CE configurations of a transistor.

e) Draw equivalent circuit of UJT & explain its working.

f) With the help of block diagram explain working of opamp.

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

a) i) State transformer equation & define turns ratio.

ii) Draw circuit symbols of DPST & DPDT switches.

b) Show that in LR circuit voltage leads current.

c) Explain working of positive clamper.

d) Draw circuit diagram of voltage divider bias & explain in brief.

e) Sketch circuit diagram to find I-V characteristics of n-channel FET.

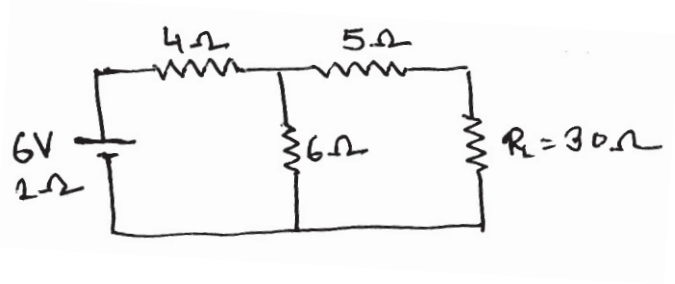
f) Obtain an expression for gain of opamp in non-inverting mode.

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

a) i) Why fuse is necessary? Why it is connected in parallel.

ii) Explain working of Reed relay.

b) Nortonize following circuit.



c) Draw Bridge rectifier with proper input & output waveforms & explain its workings.

d) Explain different types of Transistor Amplifiers with respect to operating point.

e) Describe construction & working of n-channel depletion type MOSFET.

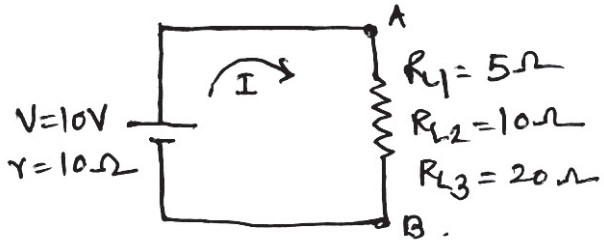
f) With the help of proper circuit diagram explain opamp as substractor.

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

a) i) Give chemical reaction involved in Lead Acid Accumulator.

ii) Draw diagram of optical fiber cable or co-axial cable.

b) Verify maximum power transfer theorem for the following circuit.



c) i) State superimposition Theorem.

ii) Draw circuit diagrams of Zener as a voltage regulator.

d) Define load line & explain it for a transistor.

e) i) Explain working of FET as a switch.

ii) Find α for β = 50 & 190 for a transistor.

f) Explain working of opamp as differentiator.

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Total No. of Questions : 5]

SEAT No. : ____

P157

[Total No. of Pages : 2

[5422]-24
F.Y. B.Sc.
ELECTRONIC - SCIENCE
EL-102 : Principles of Digital Electronics
(New) (2013 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 of calculator and log table is allowed.***
4) ***Figures to the right indicates full marks.***

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

a) Distinguish between Binary and BCD codes.

b) What is K - map? Write its advantages.

c) Convert binary numbers into 1's complement 101010, 110011

d) What is multiplexer? Write its applications.

e) Draw logic symbol and write truth table of JKFF.

f) Draw symbol of MOSFET with proper names of its terminals.

g) Differentiate between synchronous and asynchronous counters.

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

a) What is logic gate? List different types of gates. Draw their symbols.

b) Convert given nonstandard SOP expression into standard SOP expression: $AB + A\overline{C} + BC$

c) i) Perform subtraction using 1's complement: 44-22

ii) Convert $(46)_{16}=(.....)_2$

d) Explain 1:4 DEMUX using AND gates. Write the equation of its output.

e) Explain the working of JKFF constructed using only NAND gates.

f) Explain CMOS inverter with proper circuit.

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

a) Explain AND gate circuit with transistor.

b) State and verify De Morgan's second theorem.

c) What is Half Adder? Draw its logical symbol and write its truth table.

P.T.O.

d) Describe BCD to seven segment display decoder/driver with proper block diagram.

e) Draw circuit of 3-bit asynchronous UP counter using JK FF. Write its truth table.

f) Explain Tristate buffer.

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

a) Construct EXOR gate using only NAND gates.

b) Simplify following logic expression using K-map:

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

c) Draw logic circuit of FULL ADDER. Write its Truth Table.

d) Construct 4:1 MUX using 2:1 MUX. Give its function table.

e) Explain Decade counter with proper logic circuit and truth table.

f) Compare CMOS and TTL logic families (4 Points).

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

a) Explain Gray code system with suitable examples.

b) Draw logic symbols and write truth tables of OR gate and NOR gate.

c) What is parallel subtractor? Draw the logic circuit of 4 bit parallel subtractor.

d) Explain Hex to Binary encoder with the help of logic circuit.

e) Draw logic circuit of 3-bit UP-DOWN counter. Draw its timing diagram.

f) Draw circuit of 3 input DTL NAND gate and explain its action.

Total No. of Questions : 4]

SEAT No. :

P158

[Total No. of Pages : 2

[5422]-25
F.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 1 : Evolution of Strategic Thought
(2013 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) Answer in 20 words each. (any ten) **[20]**

a) Who was the founder of professional Army?

b) State the meaning of Nationalism.

c) Define "Total War".

d) By whom the well known "ARTHASASTRA" it was wrote?

e) Who was Machiavelli?

f) By whom the theory of "Heartland" it was introduced?

g) Which warfare it was introduced by sun-tzu?

h) What do you mean by "Air power"?

i) Define "Tactics"

j) State the meaning of strategy.

k) Which theory it was introduced by douhet?

l) What do you mean by geopolitics?

m) By whom the theory of sea power it was introduced?

Q2) Answer in 50 words. (any two) **[10]**

a) Explain the concept of geopolitics.

b) Write a fewlines on Karl Haushofer.

c) Write fewlines on "Industrial Revolution".

d) What do you know about Adam Smith?

P.T.O.

Q3) Answer in 150 words. (any two) **[20]**

a) Explain Kautilya as a "Strategic Thinker".

b) Analyse the views of Mao-Tse-Tung on guerilla Warfare.

c) Explain the various causes of war.

d) Discuss in detail the origin of Modern Warfare.

Q4) Answer in 300 words. (any two) **[30]**

a) Evaluate an implications of American Civil War on contemporary Scenario.

b) Explain the elements of sea power as per A.T. Mahan.

c) Discuss the geopolitical thoughts of prof Mackinder.

d) Write a note on views of douhet on Air power.

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Total No. of Questions : 4]

SEAT No. : ____

P159

[Total No. of Pages : 2

[5422]-26
F. Y. B. Sc.
DEFENCE AND STRATEGIC STUDIES
Ds : 2 - India's National Security
(2013 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 20 words (Any Ten) : **[10 × 2 = 20]**

a) State the meaning of National Defence.

b) What do you mean by strategic environment?

c) Write the meaning of Grand strategy

d) Define political geography

e) Write the meaning of operational planning.

f) State the meaning of internal security.

g) Define Low intensity conflicts.

h) State the meaning of military power

i) Write any two functions of civil defence

j) Define information Warfare.

k) Write the meaning of Conventional war strategy.

l) State the meaning of economic globalization

m) Define maritime security.

P.T.O.

Q2) Answer in 50 words (any two) : **[2 × 5 = 10]**

a) Explain India's relationship with Myanmar.

b) Discuss difficulties in India's land border management.

c) Explain Left Wing Extremism (LWE) in India.

d) Discuss India's security challenges to North East Region in India.

Q3) Answer in 150 words (any two) : **[2 × 10 = 20]**

a) Explain development of military technologies in India sine 1947.

b) Discuss status of civil-military relations in India.

c) Assess india's military preparedness vis-a vis china

d) Discuss importance of transportation in logistics management

Q4) Answer in 300 words. (any two) : **[2 × 5 = 30]**

a) Discuss india's nuclear policy and potentials.

b) Write a note on the strategic environment in Indian ocean region.

c) Discuss India's relation with Pakistan with reference to Kashmir dispute.

d) Write a note on the security challenges to India's North-west borders.

Total No. of Questions : 4]

SEAT No. :

P160

[Total No. of Pages : 2

[5422]- 27
F.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS-3 : International Security
(2013 Pattern) (Paper-III)

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) **[10×2=20]**

a) State the meaning of equal Security
b) Define arms control
c) Define international security
d) State the meaning of Regionalism
e) Write the meaning of nation core values.
f) What do you mean by nation state?
g) What do you mean by peace making?
h) Define international law
i) What do you mean by conflicts studies?
j) State the meaning of pacific settlement
k) What do you mean by globalization?
l) Define common security
m) Define National power

Q2) Answer in 50 Words (Any Two) **[2×5=10]**

a) Explain methods of Balance of power (BOP)
b) Discuss India's regional security environment
c) Explain basic features of Collective Security
d) Discuss features of common security

P.T.O.

Q3) Answer in 150 Words (Any Two) **[2×10=20]**

a) Explain role of Regional organization in world security

b) Discuss problems and prospects of Arms control

c) Explain problems and prospects of Non-alignments movement (NAM)

d) Discuss role of U.N.O in maintaining world peace and security

Q4) Answer in 300 Words (Any Two) **[2×15=30]**

a) Discuss role of international law in maintaining world peace

b) Explain scope and nature of peace studies

c) Discuss UN system of Pacific settlement of Disputes

d) Write a short note on the various elements of National power

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Total No. of Questions :5]

SEAT No. :

P161

[Total No. of Pages :2

[5422] -28

F.Y.B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 101 : Fundamentals of Environmental Chemistry & Environmental Biology

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

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

Instructions to the candidates:

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

Q1) Answer the followings in not more than 5 lines: **[16]**

a) State branches of Biology.

b) Write down any 2 applications of Environmental Chemistry.

c) What is meant by Genetic drift.

d) Write down any 2 principles of Green Chemistry.

e) Enlist 5 kingdom system of classification.

f) Write down any 2 characteristics of Bryophytes.

g) Define term - Food aduteration.

h) Enlist any 2 harmful effects of Cadmium on human health.

P.T.O.

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

a) Write short note on - Titrimetric methods.

b) Write short note on morphological and physiological adaptations in Xerophytes

c) Explain Sulphur oxide Chemistry.

d) Define Taxonomy and write its principals.

e) Explain Microbial Transformation of Nitrogen.

f) Write down Forest types in India

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

a) Discuss Physical, Chemical Properties and its biological effects of cadmium on Human being.

b) Discuss Charle's Darwin Voyage of HMs Beagle.

c) Food additives.

d) Microbial life in Air, Water and Soil.

e) Explain unusual properties of water.

f) Describe Phosphorous cycle with diagram.

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

a) Discuss Pescide remains and impacts of it on Human Health and Environment.

b) Define Biogeography and explain various Biogeographical zones in India.

c) What are Aduterants in Food and write its properties and their effects.

d) Explain the concept of Mass Extinction with suitable examples.

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

a) What are Bioresources and explain its uses, threats and extraction of Bioresources.

b) Write down - Definition of surfactants and types of Surfactants.

♦ ♦ ♦

Total No. of Questions :5]

SEAT No. :

P162

[Total No. of Pages :2

[5422] -29

F.Y.B.Sc.

ENVIRONMENTAL SCIENCE

EVS - 102 : Fundamentals of Environmental Geosciences & Environmental Pollution

(2013 Pattern) (New Course) (Paper - II)

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

Instructions to the candidates:

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

Q1) Answer the followings in not more than 5 lines: **[16]**

a) What is weathering?

b) State difference between -Biodegradable and non-biodegradable waste

c) What is Earthquake

d) Define : Salinisation.

e) What is Eutrophication?

f) Mention 2 benifits of organic farming.

g) What is green house effect?

h) Enlist sources and effects of noise pollution?

P.T.O.

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

a) What are the causes and effects of acid rain?

b) What is wind, explain the factors affecting wind.

c) Write the significance of geothermal energy.

d) Discuss the reasons of droughts.

e) Explain the chemistry and control measures of ozone deplection.

f) What is 'Continental Drift theory'?

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

a) Marine pollution.

b) Global warming.

c) Eutrophication.

d) Biofertilizers.

e) Sedimentary rock.

f) Concept of Metamorphism and its types.

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

a) Explain Mitigatory measures for natural calamities.

b) Discuss appropriate irrigation and drainage techniques.

c) Explain soil formation process in detail.

d) Discuss the significance of solar energy.

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

a) Classify and discuss various types of pollutants on the basis of physical environment and sources.

OR

b) What is meant by precipitation? Explain the factors affecting it describe different form's of precipitation.

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No. :

P138

[Total No. of Pages : 3

[5422]-3
F.Y. B.Sc.
PHYSICS - I
Mechanics, Heat and Thermodynamics
(2013 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.***
3) ***Use of log table and calculator is allowed.***
4) ***Neat diagram must be drawn wherever necessary.***

Q1) Attempt all of the following (Each of two marks) : **[16]**

a) Why Newton's first law is called law of inertia?

b) Define potential energy of a body. Give its S.I. Unit.

c) Define coefficient of viscosity. Give its dimensions.

d) Calculate Poisson's ratio σ for brass.

Given : $Y = 10 \times 10^{10}$ N/m^2 and $K = 10 \times 10^{10}$ N/m^2

e) State the law of corresponding states.

f) What is meant by reversible change? Give example.

g) State principle of platinum resistance thermometer.

h) A reversible refrigerator works between 273ºK and 330ºK. Calculate the coefficient of performance.

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

a) What is electromagnetic force? Give the properties.

b) Define work done. Calculate the work done by varying force.

c) Describe in detail Jaeger's method to determine surface tension of a liquid.

d) A bullet of mass 25 gm was moving with a speed of 400 m/s. After passing through a solid substance, it is continued to move at the rate of 100 m/s. How much work the bullet had to do in passing through a solid substance.

P.T.O.

e) Show that the work done during volume strain is ½ × Volume stress × Change in volume.

f) What is the pressure on a swimmer 10m below the surface of a lake?

(Given : Pa = 1.013×10^5 N/m^2)

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

a) Describe Amagat's experiment.

b) Derive an expression for work done during an isothermal process.

c) Show that the entropy remains constant during a reversible cyclic change.

d) A 1.5 litre of hydrogen at 137ºC and 10^6 dyne cm^{-2} pressure expands isothermally, until its volume is doubled. Find the pressure of the gas.

e) The efficiency of Otto engine is 50%. If the value of γ for the working substance is 1.5, find the compression ratio.

f) What temperature on the Reaumur scale is represented by the same number of Fahrenheit scale?

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

a) State and prove Bernoulli's theorem.

b) i) A rectangular metal bar is supported at its two ends on knife edges and a load is applied at the middle point. Obtain the Young's modulus of the bar.

ii) A man pulls a box of 12.4 Kg with a force of 40 N inclined to the horizontal at an angle of 30º. As a result, the box accelerates horizontally. What is the magnitude of the acceleration?

c) i) Define Young's modulus, modulus of rigidity and bulk modulus and state the relation between them.

ii) Find the work done in blowing a soap bubble of radius 8 cm. Surface tension of a soap solution is 25 dynes/cm.

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

a) Obtain Second Latent heat equation in the form $\frac{dL}{dT}=\frac{L}{T}=C_2-C_1$.

b) i) Distinguish between Diesel engine and Otto engine.

ii) Calculate the critical temperature for helium from the following data :

a = 3.44 Jm^3 K $mole^{-2}$, b = 0.0234 m^3 K $mole^{-1}$ and R = 8.31 J $mole^{-1}$ K^{-1}.

c) i) Explain construction and working of liquid filled thermometer.

ii) A reversible heat engine working between 0ºC and 100ºC absorbs 700 J of heat from the source. Calculate work done.

Total No. of Questions : 4]

SEAT No. : [ ]

P163

[Total No. of Pages : 4

[5422]-30

F.Y. B.Sc.

FOUNDATION COURSE (Restructuring)

(2013 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) Explain the following concepts in 50 words each (Any two) : **[10]**

a) Liberty

b) Privatization

c) National Integration

d) Social Values.

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

a) Sattyashodhak Samaj

b) Culture

c) Types of Economy

d) Gender disparity

e) Unemployment

f) Scientific methods

Q3) Write answer of following questions in 200 to 250 words each (Any three) :**[30]**

a) Give an account on Indian Religions.

b) State the merits and demerit of Indian Democracy.

c) Write the effect of science and technology on transport and communication.

d) State the characteristics of Indian Society.

e) Explain the merits and demerits of privatization.

P.T.O.

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

a) What is Science? Explain the characteristics of Science.

b) Describe the causes and consequences of growing population in India.

Total No. of Questions : 4]

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[5422]-30

F.Y. B.Sc.

FOUNDATION COURSE (Restructuring)

पायाभूत अभ्यासक्रम

(2013 पॅटर्न)

(मराठी रूपातंर)

वेळ : 3 तास] **[एकूण गुण : 80**

सूचना :– *1)* सर्व प्रश्न सोडविणे अनिवार्य आहे.

2) उजवीकडील अंक प्रश्नांचे पूर्ण गुण दर्शवितात.

3) संदर्भासाठी मुळ इंग्रजी प्रश्नपत्रिका पाहावी.

प्र.1) पुढील संकल्पना 50 शब्दात स्पष्ट करा (फक्त दोन) : **[10]**

अ) स्वातंत्र्य

ब) खाजगीकरण

क) राष्ट्रीय एकात्मता

ड) सामाजिक मूल्ये

प्र.2) पुढील टीपा 100 शब्दांत लिहा (फक्त चार) : **[20]**

अ) सत्यशोधक समाज

ब) संस्कृती

क) अर्थव्यस्थेचे प्रकार

ड) लैगिंक विषमता

इ) वैज्ञानिक पद्धती

प्र.3) पुढील प्रश्नांची उत्तरे 200 ते 250 शब्दांत लिहा (फक्त तीन) : **[30]**

अ) भारतातील प्रमुख धर्माविषयी माहिती लिहा.

ब) भारतीय लोकशाहीचे गुण दोष सांगा.

क) विज्ञान आणि तंत्रज्ञानाचा वाहतुक व दळणवळणाच्या साधनांवरील परिणाम लिहा.

ड) भारतीय समाजाची वैशिष्ट्ये लिहा.

इ) खाजगीकरणाचे फायदे व तोटे लिहा.

प्र.4) पुढील एका प्रश्नाचे उत्तर 500 शब्दांत लिहा. **[20]**

अ) विज्ञान म्हणजे काय? विज्ञानाची वैशिष्ट्ये स्पष्ट करा.

ब) भारतीय लोकसंख्या वाढीची कारणे व परिणाम स्पष्ट करा.

Total No. of Questions : 10]

SEAT No. :

P164

[Total No. of Pages :3

[5422]-31
F.Y. B.Sc. (Vocational)
INDUSTRIAL CHEMISTRY-I
(2013 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.***
3) ***Draw neat diagrams wherever necessary.***

SECTION- I

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

a) Active centers.

b) Peptization.

c) Enzymes.

d) Chemisorption.

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

a) What are kinetic properties of solutions?

b) Distinguish between emulsion and gel.

c) Explain condensation method for preparation of sol.

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

a) Describe two factors affecting catalysis.

b) Give an account of Freundlich adsorption isotherm.

c) Describe the process of dialysis.

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

a) Describe the mechanism of acid-base catalysis using suitable mechanism.

b) What are gels? How are they classified? Explain two methods for preparation of gels.

P.T.O.

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

a) Micelles

b) Negative catalysis

c) Ion exchangers

SECTION-II

Q6) Define and explain the following terms: **[8]**

a) Stoichiometric equation

b) Volume percent

c) Heat capacity

d) Work

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

a) Describe energy balance performed on closed system.

b) Write a note on recycling and by passing operations.

c) State and explain excess reactant.

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

a) Heat of formation

b) Critical point of a substance

c) Yield and selectivity

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

a) State and explain Raoult's Law and Henry's law.

b) Discuss the various methods of solving material balance problems for systems involving no chemical reactions.

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

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

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

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

$$C_6H_5OH_{(s)} + 7\,O_{2(g)} \rightarrow 6Co_{2(g)} + 3H_2O(l) \Delta H_3 = -729810 \text{ cal.}$$

b) If 92g of glycerol is mixed in 90g of H_2O, what is mole fraction of glycerol? (Give: molecular weight of glycerol is 92g)

c) 9.8g of H_2SO_4 is dissolved to make 100 ml of solution. Find normality and molarity of the solution.

Total No. of Questions : 6]

SEAT No. :

P165

[Total No. of Pages : 2

[5422]-32
F.Y. B.Sc. (Vocational)
BIOTECHNOLOGY
Voc. Biotech. - 101 : Biochemistry and Microbiology
(2013 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.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Answers to the two sections should be written in separate answer books.***

SECTION - I
(Biochemistry)

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

a) What are phospholipids? Give an example.

b) Define anabolism. Name any one anabolic pathway.

c) What are enzymes? Give an example.

d) Define proteins. Give any two examples.

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

a) Write a short note on isoenzymes.

b) Give the functions of carbohydrates.

c) What are lipoproteins? Give its classification.

d) Differentiate between DNA and RNA.

e) Discuss the role of proteins.

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

a) What are lipids? Give a detailed classification of lipids with the help of suitable examples.

b) Describe glycolysis pathway. Give its energetics and features.

c) Define carbohydrates. Classify carbohydrates with the help of suitable examples.

P.T.O.

SECTION - II

(Microbiology)

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

a) Define antagonism. Give one example.

b) What are acidophiles? Give one example.

c) Give examples of media for growth of fungi.

d) Give any two contributions of Robert Koch in Microbiology.

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

a) Write a short note on MPN.

b) Describe the classification of viruses giving examples.

c) Explain enrichment culture technique of Blue Green Algae.

d) Write a note on Streak plate technique.

e) Give the salient features of Archaebacteria.

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

a) What is differential media? Explain any two examples of differential media.

b) Enlist examples of special staining techniques. Describe any two in detail.

c) Define sterilization. Explain the different chemical agents used for sterilization.

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Total No. of Questions : 5]

SEAT No. :

P166

[Total No. of Pages : 2

[5422]-34
F.Y. B.Sc. (Vocational)
ELECTRONIC EQUIPMENT MAINTENANCE
Maintenance Concepts, Instruments and Appliances
(2013 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.***
3) ***Neat diagrams must be drawn wherever necessary.***

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

a) What is reliability of component?

b) What is MTBF and MTF?

c) The meter resistance is 1000Ω, maximum current I_m = 1mA. What will be value of R_{5H} to allow the meter to read 100mA?

d) What is function of delay line in CRO?

e) Define precision and accuracy of Instrument.

f) What are different signals at the output of function generator?

g) What is fuzzy logic in case of full Automatic machine?

h) What is difference between ON Line UPS & OFF Line UPS?

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

a) What is redundancy of equipment? Explain in short.

b) Write a short note on : AC voltmeter.

c) What are types of errors? Explain in brief.

d) What are different faults in hearing aid?

e) Explain the working of linear power supply.

P.T.O.

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

a) Explain the working of PMMC meter.

b) How ohmmeter works? What are its types? Explain any one.

c) Write a short note on CRT.

d) What are advantages of digital meters over analog meters?

e) How induction cooker works?

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

a) Explain the working of single trace CRO.

b) Write a short note on frequency counter. What are its applications? Explain any one.

c) Explain the working of insulation tester (megger)

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

a) Explain the working of digital multimeter.

b) What are different types of CRO probes? Explain.

c) Write a short note on: Microwave oven.

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Total No. of Questions : 5]

SEAT No. :

P167

[Total No. of Pages : 2

[5422]-35

F.Y. B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

Microorganism and Systems for Fermentation Processes

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

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

Instructions to the candidates:

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

Q1) Answer each sub-question in one or two lines. Fill in the blanks. **[16]**

a) Define 'GRAS'.

b) What is orphan drug.

c) What is the SI unit for temperature?

d) State true or false *Xanthomonas* is used in production of alcohol.

e) How would you define contamination?

f) List phases of clinical trial.

g) Who developed the 16SrRNA system of classification?

h) What is meant by validation?

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

a) Genetic engineering.

b) Process flow diagram.

c) Presentation of data.

d) Stoichiometry.

e) Lactic acid bacteria.

f) Physical variables.

P.T.O.

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

a) Patents and IP rights.

b) Importance of modeling.

c) Culture collection.

d) Uncertainty in measurement.

e) Proteobacteria.

f) Two approaches for isolation of microorganisms from environment.

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

a) Describe the Linear and non linear models of data analysis.

b) Discuss concept of strain improvement.

c) Measurements were collected to know the pH changes in fermentation broth after defined time. Calculate and represent Mean, Standard deviation and variance of data.

pH observation : 5.5, 5.9, 6.0, 6.4, 5.5, 4.9, 5.7, 6.8

d) Discuss intellectual property rights.

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

a) Explain in detail development of pharmaceutical drug.

b) Discuss the WHO's classification of microorganisms on the basis of hazards and containment level followed.

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Total No. of Questions : 5]

SEAT No. :

P168

[Total No. of Pages : 2

[5422]-36

F.Y. B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Essentials of Computer

(2013 Pattern) (Paper - I) (78710)

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

Instructions to the candidates:

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

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

a) What is BIOS?

b) Define device controller.

c) Write notes on *i* series microprocessor.

d) define bluetooth.

e) List different input devices of computer.

f) What is MODEM?

g) Explain motherboard.

h) Write notes on web camera.

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

a) Explain working of DOT matrix printer.

b) Explain CPU with block diagram.

c) Write notes on CD ROM.

d) What is instructio prefetch?

e) Explain working of plotter.

f) Write notes on HDD.

P.T.O.

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

a) Explain working of bar code printer.

b) Write notes on generations of computer.

c) Explain working of Scanner.

d) Explain front and rare panel of CPU cabinet.

e) Write notes on touch screen panel.

f) Define memory mapping.

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

a) Explain different types of software with example.

b) Write notes on OFF-line and ON-line UPS.

c) Define: i) MOUSE

ii) Interrupts in Computer

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

a) Explain different types of computer memory.

b) Explain computer system architecure with functional block diagram.

c) Define: i) DMA

ii) Digitizer

Total No. of Questions : 5]

SEAT No. :

P169

[Total No. of Pages : 2

[5422]-37
F.Y. B.Sc. (Vocational)
SEED TECHNOLOGY
Morphology, Plant Breeding & Testing for Cultivar Genuineness
(2013 Pattern) (Paper - I)

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

Instructions to the candidates:

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

Q1) Answer in two lines (any eight) **[8×2=16]**

a) What is sexual reproduction?

b) Give an example of legume type of fruit (any two)

c) Enlist the non-essential whorls of a typical flower.

d) Define a seed.

e) What is mutation?

f) Define plant breeding.

g) What is peroxidase test?

h) Give any two demerits of plant introduction.

i) What is anther culture?

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

a) Write advantages & disadvantages of self pollination.

b) Describe physical and chemical mutagens.

c) Comment on any one method of artificial vegetative propagation in detail.

d) Describe flower of wheat in detail.

e) Comment on evaluation activity in plant breeding.

P.T.O.

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

a) Grow out test.

b) Development of monocot embryo.

c) T.S. of typical anther.

d) Development of megaspore.

e) Procedure for plant introduction.

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

a) Define hybridization. Give objectives and types of hybridization.

b) Explain in detail, the process of double fertilization, in angiosperms.

c) Describe cypsela and caryopsis type of fruits with suitable examples and figures.

Q5) Answer any one of the following: **[1×16=16]**

Write diagnostic characters, floral formula and floral diagram of family Asteraceae and fabaceae.

OR

What is pure line selection? Write procedure, advantages, disadvantages and achievements of pure line selection.

Total No. of Questions : 10]

SEAT No : ____

P170

[Total No. of Pages : 2

[5422]-38
F.Y. B.Sc. (Vocational)
INDUSTRIAL CHEMISTRY
(2013 Pattern) (Paper - II)

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

Instructions to the candidates:

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

SECTION-I

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

a) Define the term ignition Temperature.

b) Give composition of LPG.

c) Give the names of different products of primary distillation of crude petroleum.

d) Give disadvantages of liquid fuels.

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

a) What is reforming? Describe the processes involved in it.

b) Write a short note on analysis of fuel gases.

c) Give a comparative account of coal-gas and coke-oven gas.

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

a) Give any one process of synthesis of oil-gas.

b) What is calorific value? Give the method for determination of calorific value.

c) Write a short note on catalytic cracking.

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

a) Describe in brief properties and uses of coke.

b) Give an account of petrochemicals derived from alkanes.

P.T.O.

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

a) Give advantages and disadvantages of the following:-

i) Blast furnace gas.

ii) Solid fuels.

b) Discuss theories of origin of petroleum.

SECTION-II

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

a) What is mica? Name two varieties of mica.

b) Give two applications of zeolites.

c) What is liquefaction?

d) Define leaching of ores.

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

a) Write a short note on pyrometallurgy.

b) Write a short note on alumina.

c) Discuss the process of roasting with suitable examples.

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

a) Define slags and classify them according to their stoichiometry.

b) What are the different forms of silica? Explain their stability at different temperatures.

c) Write a short note on clays.

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

a) Discuss the principles of extraction of metals from their oxide ores.

b) What is a furnace? List the different types of furnaces used in metallurgy.

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

a) What are the different allotropes of carbon. Discuss in detail.

b) What is refining of metals? give any two processes of refining commonly used.

Total No. of Questions : 6]

SEAT No :

P171

[Total No. of Pages : 2

[5422]-39
F.Y. B.Sc. (Vocational)
BIOTECHNOLOGY
VOC. BIOTECH-102 : Biophysics & Instrumentation, Mathematics, Statistics, Computers for Biologists.
(2013 Pattern) (Paper-II)

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

Instructions to the candidates:

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

SECTION - I
(Biophysics and Instrumentation)

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

a) Define partition co-efficient. Give its formula.

b) Give any two applications of SDS-PAGE.

c) What is ultracentrifugation?

d) State the Lambert's law.

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

a) Describe the principle and applications of thin layer chromatography.

b) Write a brief note on paper electrophoresis.

c) Differentiate between nephelometry and turbidometry.

d) Describe the working of a pH-meter

e) Explain Geiger Muller counting method in detail.

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

a) Explain the principle of ion-exchange chromatography. Give its procedure and applications.

b) Describe IR spectroscopy technique. Give the applications of IR spectroscopy.

c) Describe the principle and working of SEM with a suitable diagram.

P.T.O.

SECTION—II

(Mathematics, Statistics and Computer for Biologists)

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

a) If $y = 5^{\sin x.e^x}$, Find $\frac{dy}{dx}$.

b) Define standard deviation. Give formula to calculate standard deviation.

c) What are input devices? Name any 2 input devices.

d) Evaluate $\lim_{x\to\sqrt{2}} \frac{x^2+3x\sqrt{2}-8}{x^2-2}$

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

a) Differentiating w.r.t.x. $\frac{2}{\sqrt{x}} + \frac{3}{3x\sqrt{x}} + \frac{2}{5x^2+\sqrt{x}}$

b) Find limit of the sequence $\left\{\frac{2n^2+3n+7}{3n^2+5n+2}\right\}_0^{\infty}$

c) Write a note on Binomial distribution

d) Explain the Test for goodness of fit

e) Describe LAN and WAN?

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

a) i) If $a_1 = \frac{2}{7}, a_n = \frac{n^2+1}{2n^2+5}, s_1 = a_1, s_2 = a_1 + a_2,$

$s_n = a_1 + a_2 + \ldots a_n$. *Find* s_2, s_3.

ii) Find $\frac{dy}{dx}$, *if* $y = \log\left(\frac{x+\sqrt{x^2+a^2}}{-x+\sqrt{x^2+a^2}}\right)$.

b) What is Mean? Calculate Mean, standard deviation and Coefficient of variation from following data. 25, 29, 33, 31, 24, 27, 28, 33, 31, 32, 33, 34,27,28,30,31,32.

c) Describe the steps involved in experimental designing.

d) Explain role and importance of computers in biological sciences.

Total No. of Questions : 5]

SEAT No : ____

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[Total No. of Pages : 3

[5422]-4
F.Y.B.Sc.
PHYSICS
Physics Principles and Applications and Electromagnetics
(2013 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 logtables and calculator is allowed.***
4) ***Neat diagrams must be drawn wherever necessary.***

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

a) What do you mean by electromagnetic spectrum.

b) What is stimulated emission of radiation.

c) Give the characteristics of ionic bond.

d) What is the wavelength of a wave with frequency of 4.28GHZ? (Given : $C = 3 \times 10^8$ m/s)

e) Define the terms : Surface charge density and Volume charge density.

f) State the relation between three electric vectors $\vec{D}$, $\vec{E}$ and $\vec{P}$.

g) What do you mean by magnetic field.

h) Calculate the potential due to a dipole of dipole moment 2×10^{-10} cm at distance 1 m from it on its axis.

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

a) What are the drawbacks of Bohr model.

b) Explain the working of microwave oven with schematic diagram.

c) Explain covalent bond in hydrogen (H_2) molecule.

P.T.O.

d) Given the energy level of 6.624×10^{-18} J imparted to an electron stream by X-ray device. Calculate frequency and wavelength.
(Given : h = 6.625×10^{-34} Js, c = 3×10^{8} m/s)

e) The vibration frequency for diatomic molecule HF is 1.24×10^{14} HZ. The mass of hydrogen atom and fluorine atom are 1.67×10^{-27} kg and 3.15×10^{-26} kg. Find force constant K for interatomic force.

f) Find the wave number of second line of the Paschen series.

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

a) Obtain an expression for electric intensity due to point charge and due to group of point charges.

b) Using Biot-Savart's law obtain an expression for magnetic field produced in long straight conductor.

c) State and prove Gauss's Law in dielectrics.

d) A bar magnet made of iron has magnetic moment 2.0 Am^2 and mass 5×10^3 q. If the density of iron is 7874 kg/m^3. Find the intensity of magnetization.

e) A tightly wound long solenoid having 100 turns/cm carries a current of 3.0 A. Find the magnetic intensity H, magnetic field B at the centre of solenoid.

f) Calculate the force between two balls each having a charge of 12 μc and are 8 cm apart. (Given : $\in_o = 8.85 \times 10^{-12}$ c^2/Nm^2)

Q4) Attempt Any TWO of the following: **[16]**

a) Explain the characteristics of LASER and applications of LASER.

b) i) Explain hydrogen bonding in water in brief with necessary diagram.

ii) Find the linear and angular velocity in the first orbit of hydrogen atom. (Given : Radius of first Bohr orbit is 0.52 A°)

c) i) Explain laser action using three level energy system.

ii) The lowest vibrational states of the NaCl molecule are 0.063 ev apart. Find the approximate force constant of this molecule. (Given : Reduced mass of NaCl (μ) = 2.3×10^{-26} kg, 1 ev = 1.6×10^{-19} J)

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

a) State Ampere's circuital law. Obtain an expression for the magnetic field on the axis of solenoid.

b) i) Explain electric dipole and dipole moment with necessary diagram.

ii) An electric flux of 6×10^3 Nm^2/C is found to be linked with a sphere due to some charge inside it. Calculate the magnitude of charge inside the sphere. (Given : $\in_o = 8.85 \times 10^{-12}$ c^2/Nm^2)

c) i) Explain the term : Paramagnetism and Diamagnetism.

ii) A dielectric slab of thickness 0.6 cm and dielectric constant k = 5 is placed between the parallel plates of plate area 0.01 m^2 and separation 0.015 m. A potential difference of 150 volt is applied with no dielectric present. If the battery is connected and dielectric is inserted. Find E and D in the dielectric (Given : $\in_o = 8.85 \times 10^{-12}$ c^2/Nm^2)

Total No. of Questions : 5]

SEAT No :

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[Total No. of Pages : 2

[5422]-41
F.Y. B.Sc. (Vocational)
ELECTRONIC EQUIPMENT & MAINTENANCE
Electronic Components Circuit and Equipment Assembly
(2013 Pattern) (Paper-II) (78120)

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

Instructions to the candidates:

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

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

a) Factors on which Resistance depends.

b) Explain the factors on capacitance of a capacitor depends.

c) Explain the factors on which inductance of a Inductor depends.

d) Explain the term SMD.

e) State different types of PCB.

f) Name different types of Resistances.

g) Explain different losses that occur in transformers.

h) Explain importance of flux.

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

a) Explain causes and remedies at dry solder.

b) Explain the importance of different safety devices used for domestic purpose.

c) Enlist tools required for desoldering.

d) With the help of a neat diagram explain internal connections of Bread Board.

e) Inductor is a wattles component comment **.**

P.T.O.

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

a) Draw different circut symbols used in Electronics any Eight.

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

c) Name different types of cables used in Electronic industry.

d) State the advantages of surface mount Technology.

e) State what information do you get from circuit diagram.

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

a) Explain the importance of Earthing and also Explain how Earthing is done.

b) With the help of a neat diagram working of a Fan and Regulator.

c) With the help at a neat diagram explain the working of MCB.

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

a) Explain Electric Shock? What precautions should be taken to avoid Electric shock.

b) Write a note on precautions to be taken during soldering and desoldering.

c) Explain different causes of failures of a Instrument.

Total No. of Questions : 5]

SEAT No : ____

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[Total No. of Pages : 2

[5422]-42
F.Y. B.Sc.
INDUSTRIAL MICROBIOLOGY
Industrial Processes and Products
(Vocational) (Paper-II) (2013 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Use of logarithmic tables, slide rule, mollier charts, electronic pocket calculator and Steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) Answer any eight of the following. **[16]**

a) Enlist two organisms used for production of organic acids.

b) Describe in brief use of enzymes for treatment of wood pulp.

c) Who are venture capitalists?

d) What is an industrial strain?

e) Enlist two organisms used for production of amino acids.

f) Describe in brief use of enzymes for textile manufacturing.

g) Give two examples of complex media.

h) Enlist two organisms used for production of ethanol.

i) What is 'Due Diligence'?

j) Name two enzymes used for analytical purpose.

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

a) Discuss the concept of 'Bioremediation'.

b) Describe the process of 'Shikonin production'.

c) Draw neat and labelled diagram of a fermenter vessel.

d) Discuss the role of microorganisms in 'Environmental biotechnology'.

e) Explain the application of microorganisms in biomining processes.

f) Give importance of antifoam in fermentation process.

P.T.O.

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

a) Business plan

b) Polysaccharides

c) Butanol

d) Inhibitors

e) Operating cost

f) Culture collection

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

a) Explain strategy to establish a biotechnology company.

b) Discuss the concept of 'Nitrogen source' with the help of suitable examples.

c) What are the basic criteria for design and optimization of fermentation process?

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

a) Discuss in detail the overall characters of industrially important microorganisms.

b) What are the basic applications of a Biotechnology based company?

Total No. of Questions : 5]

SEAT No : ____

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[Total No. of Pages : 2

[5422]-43
F.Y. B.Sc (Vocational)
COMPUTER HARDWARE AND NETWORK ADMINISTRATION
Computer Organization
(2013 Pattern) (Paper-II) (78720)

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 software

b) What is HDMI?

c) Explain POST

d) What is compiler?

e) Define Simulator.

f) List different segment registers of 8086.

g) Write notes on USB.

h) What is debugger?

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

a) Write notes on Wi Fi system.

b) Explain any two logical instructions of 8086

c) Define math coprocessor

d) Write notes on internet.

e) Explain Tri state buffer.

f) Write notes on micro processor.

P.T.O.

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

a) Explain control panel of window operating system.

b) Explain any two data transfer instructions of 8086.

c) Define Multimedia.

d) Explain different network topologies.

e) Explain the main functions of operating system

f) Write notes on flag register of 8086.

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

a) Explain ANDROID operating system

b) Explain flow chart with example.

c) Define i) Device driver

ii) Emulator

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

a) Explain architecture of 8086 with block diagram.

b) Explain network operating system

c) Write notes on i) Firmware

ii) Algorithm

Total No. of Questions : 5]

SEAT No : ____

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[Total No. of Pages : 2

[5422]-44
F.Y. B.Sc. (Vocational)
SEED TECHNOLOGY
Seed Physiology and Seed Production
(Paper-II) (2013 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 labeled diagrams wherever necessary.***

Q1) Answer in two lines (Any eight) **[16]**

a) Define seed germination.

b) What are synthetic seed?

c) Define seed vigour.

d) Enlist types of dormancy

e) What is seed longevity?

f) Define roughing.

g) What are breeders seed?

h) Enlist different methods of sowing.

i) Define genetic purity of seed.

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

a) Comment on composition of seed storage.

b) Explain various methods to break seed dormancy.

c) Comment on importance of seed vigour.

d) Explain seed as basic input in agriculture.

e) Describe different methods of irrigation.

f) Give an account of types of nursery beds.

P.T.O.

Q3) Write notes on Any Four of the following: **[16]**

a) Physiology of seed development. **[5]**

b) Seedling abnormalities and its causes.

c) Short term and long term storage.

d) National seed corporation.

e) Multiplication of new variety.

f) Seed rate and time of sowing.

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

a) Define disease. Explain biotic and abiotic causes of diseases.

b) Comment on Quality of irrigation water and losses due to excessive irrigation.

c) Explain production of synthetic seed.

d) Write on biochemical changes during seed germination.

Q5) Define seed dormancy. Explain various factors causes seed dormancy. **[16]**

OR

Give an account of causal organism, symptoms disease cycle and control measures for early blight of tomato.

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

[5422] - 45

F.Y.B.Sc.

NANOSCIENCE & NANOTECHNOLOGY

(2018 Pattern) (Paper - I)

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

Instructions to the candidates:

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

Q1) Attempt all of the following: **[8×2=16]**

a) Define carbon nanotubes.

b) What is mean by precusors?

c) What is quantum dot?

d) What is ferritine?

e) What are the two main effect observe in nanoscopic colours?

f) MEMS stands for what?

g) Give types of chemical vapour deposition.

h) What is top down process?

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

a) Explain, How marine vertebrates servive?

b) Write a note on 1-D nanomaterial.

c) Explain concept of nanotechnology at pre 18^{th} century.

d) Explain with neat labelled diagram metal organic chemical vapour deposition technique.

e) Explain synthesis of nanoparticle using micro-organism.

f) Write a note on SILAR method.

P.T.O.

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

a) Explain synthesis using DNA molecule.

b) Explain synthesis of metal & semiconductor nanoparticle by chemical route.

c) Write a note on sono chemical synthesis.

d) Give the advantages of hydrothermal synthesis.

e) Write a flow chart to show reduction methods of nanoparticles using micro-organism.

f) Write a note on spray-pyrolysis method.

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

a) Explain Langmuir Blodgett method labelled diagram.

b) Explain electro-deposition technique.

c) Explain application of quantum dot.

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

a) Explain nano-perspectives.

b) Explain with neat labelled diagram surface plasmon resonance.

c) Give the advantages of Sol-Gel technique.

EEE

Total No. of Questions : 5]

SEAT No. :

P177

[Total No. of Pages : 2

[5422]-46
F.Y.B.Sc.
NANOSCIENCE
Nanotechnology
(2013 Pattern) (Paper - II)

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

Instructions to the candidates:

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

Q1) Attempt all of the following. **[8 × 2 = 16]**

a) Define Miller indices.

b) What is luminescence?

c) Define mesoporous materials.

d) What is mean by interplaner distance.

e) Define liquidus line.

f) What is mean by phase equillibrium.

g) Give the uses of insulators.

h) What is mean by primitive translation vectors?

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

a) Explain the types of semiconductors.

b) What is mean by packing fraction? Derive an expression of packing fraction for simple cubic crystal.

c) Write a note on - i) Mass Spectroscopy
ii) Spectrochemical methods

d) Explain volumetric analysis method.

e) What are aerogels? Explain properties of aerogels.

f) Explain bonding & antibonding states.

P.T.O.

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

a) What is surface area? Explain porosity of material.

b) State & explain Gibb's phase rule.

c) Explain the uses of thermal gravimetric analysis method.

d) What is mean by Bravais lattice? Explain any two structures of 3D Bravais lattices with proper diagram.

e) Write down the types of luminescence. Explain basic principle of PL-Spectroscopy.

f) Explain electron-matter interaction.

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

a) Derive an expression of interplaner distance for cubic system.

b) What is mean by phase diagram? With neat labelled diagram explain type-II phase diagram.

c) With neat labelled diagram explain scanning electron microscope.

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

a) What is mean by atomic radius? Determine the atomic radius for BCC & FCC structures.

b) With neat labelled diagram explain dispersive infrared spectrometer.

c) Define solubility limit. With neat labelled diagram explain Cu-Ni phase diagram.

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No. :

P140

[Total No. of Pages : 3

[5422]-5
F.Y. B.Sc.
CHEMISTRY - I
Physical and Inorganic Chemistry
(2013 Pattern) (Theory) (Paper - I) (71310)

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.***
4) ***Use of logtable and calculator is allowed.***

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

a) What is negative catalysis? Give one example.

b) Give the rule of differentiation for added and subtracted function.

c) What is Brownian movement?

d) Define the terms:

i) frequency

ii) wavenumber

e) State the third law of theromodynamics.

f) Define :

i) Molality

ii) Equivalent weight

g) Explain the formation of ionic bond with suitable example.

h) What is the volume of 14 grams of N_2 at N.T.P?

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

a) What is vapour pressure of liquid? Describe isoteniscope method for measurement of vapour pressure.

b) What is emulsion? Explain types of emulsions.

c) Write the equation of the line passing through point

i) (1, 3) and (2, 8)

ii) (1, 2) and slope $^{-3}/_{2}$

P.T.O.

d) Give the assumptions of Bohr's theory.

e) Obtain the expression for entropy change of an ideal gas when its volume and temperature are changed simultaneously.

f) What is Heisenberg's uncertainty principle? Give its physical significance.

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

a) i) If $y = (x^2 + 8)(x^2 + 2)$; find $\frac{dy}{dx}$.

ii) Solve the integral $\int_1^3 3x^3 dx$.

b) Distinguish between physical adsorption and chemical adsorption.

c) State first law of thermodynamics. Give its limitations.

d) Derive an expression for energy of hydrogen atom.

e) Give the assumptions of kinetic molecular theory of gases.

f) Explain the causes for deviations of real gases from ideal behaviour.

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

a) Balance the following equation by ion-electron method

$$Fe^{2+} + Cr_2O_7^{2-} \longrightarrow Fe^{3+} + Cr^{3+}$$

b) Explain the formation of N_2 molecule on the basis of atomic orbital overlap.

c) What is SP hybridisation? Explain with suitable example.

d) What are the limitations of VSEPR theory.

e) Define

i) Molar mass

ii) Standard solution

iii) Redox reaction

iv) Normality

f) Calculate the oxidation number of the following

i) I in HIO_4

ii) Fe in $FeSO_4$

iii) P in $P_2O_7^{4-}$

iv) N in NO_3^-

Q5) Solve any Four of the following : **[16]**

a) 0.1212 grams of dry gas occupies a volume of 65.7 ml at 10ºC and 740 mm pressure. Calculate the molecular weight of the gas.

b) How will you prepare

i) 300 ml 0.5N NaCl solution

ii) 200 ml 0.2M NaOH solution.

(Given: Atomic weight of Na = 23, Cl = 35.5, O = 16, H = 1)

c) Calculate the frequency and wavenumber associated with radiation of wavelength 550 nm and 650 nm.

d) Calculate the entropy change in a reversible isothermal process at 300 K when 2 moles of a gas changes its volume from 10 liter to 20 liter. ($R = 8.314\ JK^{-1}\ mole^{-1}$).

e) Calculate the pressure exerted by 2 moles of water vapour in 20 liter at 373 K using Vander waals equation.

(Given: $a = 5.52\ l^2$ atm $mole^{-2}$, $b = 0.0304\ l\ mole^{-1}$

$R = 0.082$ lit atm $K^{-1}\ mole^{-1}$).

f) Calculate the flow time for benzene at 20ºC from the following data

	Benzene	Water
density	998.2 gm dm^{-3}	879 gm dm^{-3}
Viscosity	0.0065 poise	0.01002 poise

(Given: flow time of water = 10 sec)

Total No. of Questions : 5]

SEAT No. :

P141

[Total No. of Pages : 4

[5422]-6
F.Y. B.Sc.
CHEMISTRY - II
Organic & Inorganic Chemistry
(2013 Pattern) (Theory) (Paper - II)

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

Instructions to the candidates:

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

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

a) Explain the term tautomerism with suitable examples.

b) Draw zig-zag structures of the following compounds.

i) Diethyl ether

ii) 2-butanol

c) Explain the following terms :

i) enantiomers

ii) optical activity

d) What is hydrogen bonding? Give examples to illustrate your answer.

e) Carboxylic acids have higher boiling point than alcohols of comparable molecular weight. Explain.

f) Alkali metals does not show +II oxidation state. Explain.

g) Define:

i) Ionization energy

ii) Electronegativity

h) Write names and electronic configuration of group V A elements.

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

a) Discuss conformational isomerism in ethane with energy profile diagram.

b) What is inductive effect? Give different types of inductive effect. Why methyl amine is weaker base than dimethyl amine.

c) What are alcohols? Give classification of alcohols. How will you prepare propyl alcohol by using Grignard's reagent.

P.T.O.

d) What are alkenes? Give major and minor products when 1-butene reacts with

i) HBr

ii) H_2O/H^+

e) What are carboxylic acids? How will you prepare acetic acid starting from

i) ethyl alcohol

ii) methyl bromide

f) What are phenols? What is the action of following reagents on phenol?

i) Br_2/water

ii) Conc. H_2SO_4/25ºC

Q3) Attempt Any Four of the following: **[16]**

a) What are amines? How will you prepare aniline from

i) benzamide

ii) benzene

b) What are alkynes? How acetylene is obtained from

i) Calcium carbide

ii) Methane

c) What is hybridisation? Discuss the formation of acetylene molecule using the concept of hybridisation.

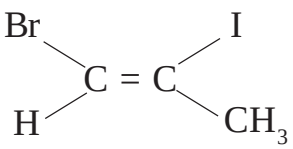
d) What are alkyl halides? What is the action of CH_3MgBr on the following compounds?

i) acetaldehyde

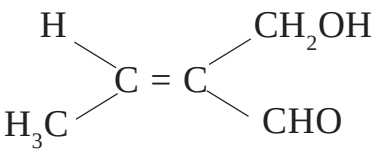
ii) acetone

e) Assign E or Z configuration of the following compounds.

i)



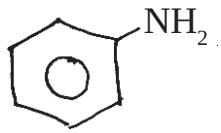
ii)



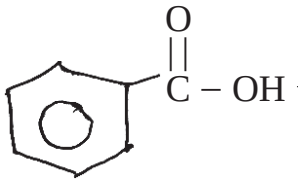
f) What are aldehydes? Explain aldol condensation with suitable example.

Q4) Attempt Any Four of the following : **[16]**

a) Identify the products A and B and rewrite the reactions (any two) :

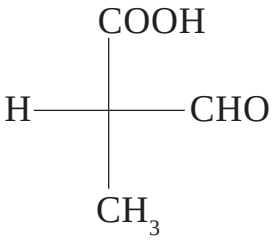
i)  $\xrightarrow[0\text{-}5^{o}C]{NaNO_2|HCL} A \xrightarrow{CuCl} B.$

ii) $CH_3 - \underset{\displaystyle Br}{\underset{|}{CH}} - CH_3 \xrightarrow[\Delta]{alc.KOH} A \xrightarrow[ii)\ H_2O_2]{i)\ HBr} B$

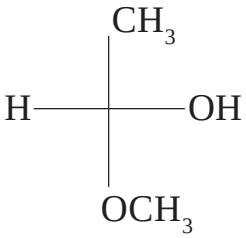
iii)  $\xrightarrow{PCl_5} A \xrightarrow{NH_3} B$

b) Assign R or S configuration of the following compounds.

i)



ii)



c) What is resonance effect? Draw resonance structures of

i) Nitrobenzene

ii) Aniline

d) Write short notes on -

i) Saytzeff's rule

ii) Williamson synthesis

e) Explain diagonal relationship between beryllium and aluminium.

f) Write notes of allotropes of carbon.

Q5) Attempt Any Four of the following : **[16]**

a) Draw the structures of 12-crown-4 and 15-crown-5 and explain their use in the seperation of alkali metals.

b) Explain anamolous behaviour of carbon n group IV A elements.

c) Explain the bonding and shapes of IF_7 molecule.

d) Explain the periodicity in properties of alkaline earth metals with respect to ionization energy and oxidation states.

e) Explain bonding and shapes of diborane.

f) Draw the structures of :

i) H_2SO_4

ii) ClF_3

iii) H_3PO_4

iv) $[XeO_6]^{4-}$

Total No. of Questions :5]

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F.Y.B.Sc.

BOTANY

BO - 111 : Fundamentals of Botany: Plant Diversity, Morphology and Anatomy

(2013 Pattern) (Theory Paper - I) (71410)

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) Define plant Diversity.

b) Give any two characters of algae.

c) Name any two classes of Eumycophyta (true fungi) according to G.M.Smith.

d) What are lichens?

e) Define anatomy.

f) What is fruit?

g) Define aestivation.

h) Name any two elements of xylem.

P.T.O.

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

a) Write the symptoms of white rust disease.

b) Describe Foliose and Fruticose lichens.

c) Describe the structure of a typical leaf.

d) Describe the structure of sporangium of Nephrolepis.

e) Describe any two types of racemose inflorescence.

f) Write the characteristics of meristimatic tissues.

Q3) Write short notes on **Any Four** of the following: **[16]**

a) Oogonium of Albugo (Cystopus)

b) Structure of sex organs in Nephrolepis.

c) Characters of Dicotyledons.

d) Pneumatophores.

e) Tuber.

f) Legume.

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

a) Describe the cell structure in Spirogyra.

b) Describe the internal structure of thallus in Riccia.

c) Describe the types of placentation studied by you.

d) What are vascular tissues? Comment on components of phloem.

Q5) Describe the structure of Cycas sporophyte and add a note on structure of it's ovule. **[16]**

OR

Describe the internal structure of Dicot stem and Monocot root.

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No. : ____

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[Total No. of Pages : 2

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F.Y.B.Sc.

BOTANY

BO- 112: Industrial Botany

(2013 Pattern) (Paper - II) (71420)

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 indicates full marks.***

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

a) What is industrial botany?

b) Give the concept of greenhouse technology.

c) What is layering?

d) Define plant tissue culture.

e) Give the concept of biofuel.

f) Enlist the names of any two fungi used in food industry.

g) What are biofertilizers?

h) What is Churna?

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

a) Describe method of spawning of Oyster mushroom.

b) Explain the harvesting and marketing of Gerbera.

c) Give the importance of seed industry.

d) Write the advantages of biofuel.

e) Write note on a cold storage.

f) Give the products and applications of Aspergillus.

P.T.O.

Q3) Write short notes on Any Four of the following: **[16]**

a) Timber.

b) Inoculation.

c) Uses of mushroom.

d) Products of Yeast.

e) Pickles.

f) Commercial significance of biopesticides.

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

a) Describe advantages of greenhouse technology.

b) What is organic farming? Give the need of organic farming.

c) Describe nitrogen fixing biofertilizer: Rhizobium.

d) Explain the method of preparation and uses of Indiana.

Q5) Describe artificial vegetative propagation by stem cutting and air layering.**[16]**

OR

Write the botanical source, active principles and medicinal uses of Adhatoda.

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Total No. of Questions : 5]

SEAT No. :

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F.Y.B.Sc.

ZOOLOGY

ZY-101: Animal Systematics and Diversity - I & II

(2013 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 side indicate full marks.***

Q1) Define/ Explain: **[16]**

a) Class

b) Polyp

c) Pellicle

d) Brow spot

e) Thrombocytes

f) Parental care

g) Gnathostomata

h) Triploblastic condition

Q2) Write short notes on (Any Four): **[16]**

a) Binomial nomenclature.

b) Salient features of Aschelminthes.

c) General characters of class calcaria.

d) Sexual dimorphism in frog.

e) Salient features of cephalochordata.

f) General characters of Protochordata.

P.T.O.

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

a) Give general characters of phylum Protozoa.

b) Contractile vacuole in Paramoecium.

c) Spermatheca in earthworm.

d) Sketch and label heart of frog.

e) Give general characters of Pisces with examples.

f) Salient features of amphibia with two examples.

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

a) Give an account of nutrition in Paramoecium.

b) Describe the nervous system of earthworm.

c) Describe functions of blood of frog.

d) Describe migration in fishes.

Q5) What is hermaphroditism? Describe in detail reproductive system in earthworm. **[16]**

OR

With neat labelled diagram give an account of digestive system of frog.