Total No. of Questions : 4]

SEAT No. :

PD-1485

[Total No. of Pages : 3

[6467] - 301
S.Y. B.Sc.
MATHEMATICS (Paper - I)
MT-231: Calculus of Several Variables
(2019 Pattern) (Credit Pattern) (Semester - III) (23111)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

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

Q1) Attempt any five of the following : **[5 × 1 = 5]**

a) Let $f(x,y)=1+\sqrt{2x-y}$. Evaluate $f(2,3)$.

b) If $f(x,y)=x^2y^3-2y^2$. Find $f_y(1,0)$.

c) Define wave equation.

d) Evaluate $\lim\limits_{(x,y)\to(1,2)} \dfrac{4-xy}{x^2+3y^2}$

e) Find critical points of the function $f(x,y)=y^2-x^2$

f) Evaluate $\int_0^2\int_0^3 (2x+y)dxdy$

g) Find the Jacobian of the transformation $x=r\cos\theta,\ y=r\sin\theta$.

P.T.O.

Q2) a) Attempt any one of the following : **[5]**

i) If the function f be differentiable at a point (a,b), then prove that f is continuous at (a,b) and the partial derivatives f_x (a,b) and f_y (a,b) both exists.

ii) Suppose that Z = f (x,y) is a differentiable function of x and y, where x = g (t) and y = h (t) are differentiable functions on t. Then prove that is differentiable function of t and $\frac{dz}{dt} = \frac{\partial z}{\partial x}\frac{dx}{dt} + \frac{\partial z}{\partial y}\frac{dy}{dt}$

b) Attempt any one of the following : **[5]**

i) Evaluate $\lim_{(x,y) \to (0,0)} \frac{xy}{\sqrt{x^2 + y^2}}$

ii) Verify that the function $z = ln\ (e^x + e^y)$ is a solution of the differential equation $Z_{xx}Z_{yy} - (Z_{yx})^2 = 0$

Q3) a) Attempt any one of the following : **[5]**

i) State and prove Euler's theorem for homogeneous functions.

ii) Describe method of Lagrange's multipliers for extreme values.

b) Attempt any one of the following : **[5]**

i) Find the shortest distance of the point (1,2,–3) from the plane $2x - 3y + 6z = 20$.

ii) Find the extreme values of the function $f(x,y) = xy + \frac{50}{x} + \frac{20}{y}$

Q4) a) Attempt any one of the following : **[5]**

i) State Fubini's theorem. Write the formula for change of Cartesian coordinates to polar coordinates in a double integral.

ii) Write the equations of relationship between rectangular coordinates (x,y,z) and spherical coordinates (r,θ,ϕ). Hence find the rectangular coordinates of a point $(2,\frac{\pi}{2},\frac{\pi}{2})$ in spherical coordinates.

b) Attempt any one of the following : **[5]**

i) Evaluate $\int_0^1 \int_0^{3-3x} \int_0^{3-3x-y} dzdydx$

ii) Evaluate $\int_0^1 \int_{3y}^3 e^{x^2} dxdy$

by reversing the order of integration.

Total No. of Questions : 4]

SEAT No. : ____

PD-1486

[Total No. of Pages : 2

[6467]-302

S.Y. B.Sc.

MATHEMATICS

MT-232 (A) : Numerical Methods and It's Applications

(2019 Pattern) (Semester - III) (CBCS) (Paper - II) (23112 A)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

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

Q1) **Attempt any FIVE of the following :** **[5]**

a) Three approximate values of the number 1/3 are given as 0.30,0.33 and 0.34. Which of these three values is the best approximation? Justify your answer.

b) Round-off the following numbers to four significant figures :
34.46235, 0.70029

c) With usual notations, prove that $\nabla \equiv 1 - E^{-1}$

d) Write the formula for $\left(\frac{dy}{dx}\right)_{x=x_0}$ in terms of forward difference operator Δ.

e) Write the trapezoidal rule to find the approximate value of $\int_{x_0}^{x_n} y dx$.

f) Find y (0.2) using Euler's methods, given that $\frac{dy}{dx} - 4y = 0, y(0) = 1, h = 0.2$

g) Find $\nabla^2 y_2$, given that y_0=3, y_1= 11, y_2= 20.

P.T.O.

Q2) a) **Attempt any one of the following :** **[5]**

i) Explain Runge-Kutta method of fourth order to solve initial value problem.

ii) Explain modified Euler's method for successive approximation.

b) **Attempt any one of the following :** **[5]**

i) Use the method of false position to find approximate root of the equation $x^3+x^2+x+7=0$ upto two iterations only.

ii) Find $y(2)$ from the following data using Lagrange's formula :

x	0	1	3	4	5
y	0	1	81	256	625

Q3) a) **Attempt any one of the following:** **[5]**

i) Explain bisection method to find root of f (x) = 0.

ii) Derive general quadrature formula for numerical integration.

b) **Attempt any one of the following :** **[5]**

i) Using Picard's method of successive approximations, solve the equation $y' = x+y^2$, subject to the condition $y=1$ when $x=0$. (Two iterations only)

ii) From the following table of values of x and y, obtain $\frac{dy}{dx}$ for $x=1.2$.

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

Q4) a) **Attempt any one of the following :** **[5]**

i) Derive Newton's forward differance interpolation formula.

ii) Define absolute, relative and percentage error. Also define absolute accuracy and relative accuracy.

b) **Attempt any one of the following :** **[5]**

i) Use the Newton - Raphson method to obtain a root, correct to three decimal places of the equation $e^x = 4x$.

ii) Evaluate

$$\int_1^3 \frac{1}{x}\,dx$$

by Simpson's rule with 4 strips.

❖❖❖

Total No. of Questions : 4]

SEAT No. :

PD-1487

[Total No. of Pages : 2

[6467]-303
S.Y. B.Sc.
MATHEMATICS
MT - 232(B) : Graph Theory
(2019 Pattern) (CBCS) (Semester - III) (Paper - II) (23112(B))

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

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

Q1) **Attempt any five of the following :** **[5]**

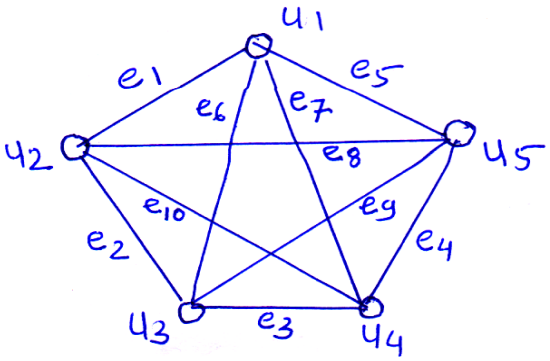
a) Define : Complete graph.
b) Define : Spanniny tree of a graph.
c) Define : Cutset of a graph.
d) Define : Euler graph.
e) If a tree T has 20 vertices then find the total edges in it.
f) If G be a graph with 10 vertices and 15 edges then find rank (G).
g) Find edge connectivity of K_5.

Q2) a) Attempt any one of the following : **[5]**

i) Prove that the number of vertices of odd in a graph is always even.
ii) If a graph G has n vertices and (n–1) edges then prove that G has either a pendant or isolated vertex.

b) Attempt any one of the following : **[5]**

i) Construct adjacency and incidence matrix of the following graph.



ii) If G be a simple graph with 9 vertices and 3 components then find the maximum possible edges in G.

P.T.O.

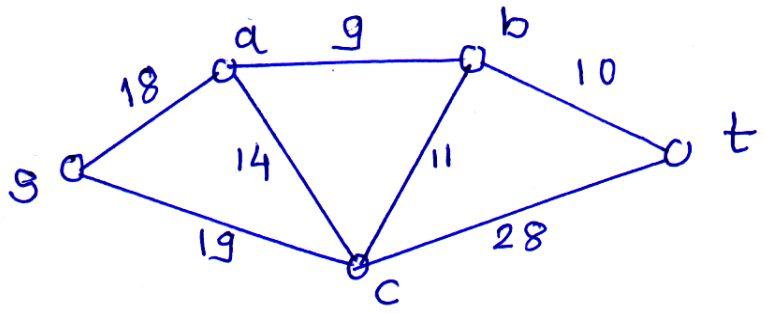
Q3) a) Attempt any one of the following : **[5]**

i) Prove that the number of vertices in a binary tree is always odd.

ii) Prove that the number of vertices in a self-complementary graph is of the type 4K or 4K+1; where K is an integer.

b) Attempt any one of the following : **[5]**

i) List all paths from vertex 's' to vertex 't' in the following graph. Also, find their lengths.



ii) What is nullity of graph? Obtain the nullity of complete graph with n vertices.

Q4) a) Attempt any one of the following : **[5]**

i) What is vertex connectivity of a graph? If a graph with n vertices with vertex connectivity is K then prove that G has at least $\frac{nK}{2}$ edges.

ii) Explain : Fundamental cutset and Fundamental circuit of a graph G.

b) Attempt any one of the following : **[5]**

i) Give an example of a graph such that

$K(G) < \lambda(G) < \delta(G)$

Where $\delta(G)$ is minimum degree of a vertex in G.

ii) I) What is complete bipartitle graph?

II) Draw $K_{3,2}$.

III) Is $K_{3,2}$ regular graph?

IV) Is $K_{3,2}$ Euler graph?

Total No. of Questions : 5]

SEAT No. :

PD1488

[Total No. of Pages : 2

[6467]-304

S.Y.B.Sc. (Regular)

PHYSICS-I

PHY-231 : Mathematical Methods in Physics-I

(2019 Pattern) (CBCS) (Semester-III) (Paper-I) (23121)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Use of calculator is allowed.***

Q1) Solve any five of the following. **[5]**

a) State De-Moivre's theorem.

b) What is partial differential equation.

c) Show that df=$(y^2+y+2xy)\,dx+(x^2+x+2xy)dy$ is exact differential.

d) Define scalar triple product.

e) Decide the degree and order of differential equation.

$$\frac{d^4y}{dx^4}-\sqrt{y^2-5}=0$$

f) What are concurrent and null vector.

Q2) Answer the following.

a) i) Determine the modulus and argument of $\frac{3+2i}{3-2i}$ **[3]**

ii) If $u=x^2+y^2$ where $x=at^2$, $y=2at$ find $\frac{du}{dt}$ using chain rule **[3]**

OR

Define the gradient of a scalar field. Explain the physical significance of gradient. **[6]**

b) The equation of state for one male of perfect gas is PV=RT show that

$$T\left(\frac{\partial P}{\partial T}\right)_v\left(\frac{\partial V}{\partial T}\right)_p=R$$ **[4]**

P.T.O.

Q3) a) i) Discuss the condition for maxima and minima for single and many variable **[3]**

ii) Find the projection of the vector $\overline{A} = \overline{i} - 2\overline{j} + \overline{k}$ on the vector $\overline{B} = 4\overline{i} - 4\overline{j} + 7\overline{k}$ **[3]**

OR

If $f = aln\,(x^2 + y^2)$ show that $f_{xy} = f_{yx}$ and $f_{xx} + f_{yy} = 0$ **[6]**

b) If $z = \sqrt{1 + \sqrt{8i}}$ **[4]**

Find:

i) its complex conjugate $\overline{z}$ and

ii) the product $z\overline{z}$

Q4) Answer the following questions.

a) i) If $|A| = |\overline{B}|$ prove that $(\overline{A} + \overline{B})$ is perpendicular to (A–B) **[3]**

ii) If $\phi = 3x^2y - y^3z^2$ find grad ϕ at point (1, –2, –1) **[3]**

OR

Show that the curl of the linear velocity of any particle of rotating body is twice its angular velocity. **[6]**

b) Show that the point $x=1$ is an ordinary point of the differential equation

$$2x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + (x-5)y = 0$$ **[4]**

Q5) Attempt any four of the following. **[10]**

a) Transform $z = 2\sqrt{3} + 2i$ into

i) Polar form

ii) exponential form

b) Find the total differential of the function $F=f(x,y)=ye^{(x+y)}$

c) Determine the value of p so that $\overline{A} = 3\overline{i} + p\overline{j} + \overline{k}$ and $\overline{B} = 4\vec{i} - 2\vec{j} - 2\overline{k}$ are perpendicular.

d) Show that $\sinh(i\theta) = i\sin\theta$

e) Show that three vectors $\overline{A} = 2\vec{i} - \vec{j} - \vec{k}$, $\overline{B} = \vec{i} + 2\vec{j} - 3\vec{k}$, $\overline{C} = 3\vec{i} + 2\vec{j} - 5\vec{k}$ are coplanar.

f) Define the terms linearity and homogeneity of differential equation.

Total No. of Questions : 5]

SEAT No. : ____

PD-1489

[Total No. of Pages : 4

[6467]-305

S.Y. B.Sc.

PHYSICS

PHY - 232 (A) : Electronics

(Paper - II A) (2019 Pattern) (CBCS) (Semester - III) (23122 A)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any 3 questions from Q2 to Q5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Use of calculator and log table is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) **Solve any five of the following :** **[5]**

a) What is constant current source?

b) Which is heavily doped region in transistor?

c) What is intrinsic stand-off ratio?

d) Define CMRR.

e) What is Barkhausen criteria of oscillation?

f) Convert (1111_2) into its equivalent decimal number.

Q2) **Answer the following :** **[6]**

a) Explain the construction and working of UJT.

OR

Explain with circuit diagram, the use of transistor as a switch. Write its advantages. **[6]**

b) State and prove De-Morgan's theorems. **[4]**

P.T.O.

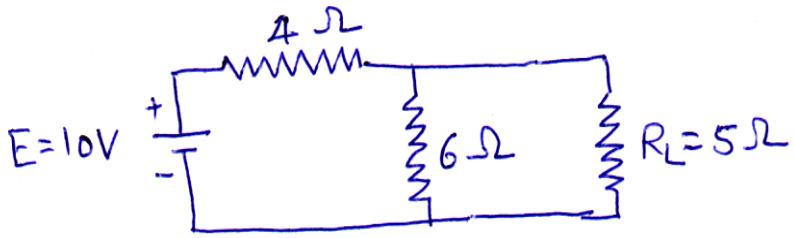
Q3) **Answer the following :**

a) Explain with circuit diagram, OP-AMP as an adder. **[6]**

OR

Explain positive and negative feedback in amplifier. **[6]**

b) Nortonize the following circuit. **[4]**



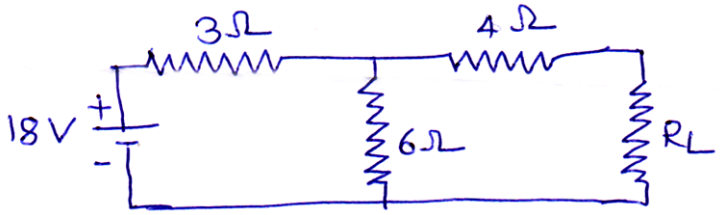
Q4) **Answer the following :**

a) Describe d.c. load line using common-emitter amplifier circuit. **[6]**

OR

What is operational amplifier? Draw a circuit diagram for inverting amplifier and derive equation for its gain.

b) For the given circuit, calculate the value of R_2 for which the power dissipated in it would be maximum. **[4]**



Q5) **Write short notes on any four of the following :** **[10]**

a) Kirchoff's current law.

b) BJT as an amplifier.

c) Relation between α and β for transistor.

d) UJT relaxation oscillator.

e) Exclusive or gate.

f) Concept of virtual ground.

Total No. of Questions : 5]

PD-1489

[6467]-305

S.Y. B.Sc.

PHYSICS

PHY - 232 (B) : Instrumentation

(2019 Pattern) (CBCS) (Semester - III) (Paper - II) (23122B)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any 3 questions from Q2 to Q5.***
3) ***Question 2 to 5 carry equal marks.***
4) ***Use of calculator and log table is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) **Solve any five of the following :** **[5]**

a) Write any two characteristics of transducer element.

b) Define active transducers with example.

c) Write advantages and disadvantages of unbounded strain gauge.

d) What is pressure? Give its S.I. unit.

e) If the amplifier has input resistance of 2.2 kΩ feedback resistance of 22kΩ. Find voltage gain A_F

f) The resistance of platinum wire at 0°C is 5.5Ω and at 1°C is 7.5Ω. Find the temperature of the wire.

Give $\alpha = 0.0039/°C$

Q2) **Answer the following questions :**

a) Draw circuit diagram and explain current to voltage converter using OPAMP. **[6]**

OR

Draw circuit diagram and explain LVDT.

b) Write advantages of platinum resistance thermometer. **[4]**

Q3) **Answer the following :**

a) Write a note on 'Thermal element as first order system of measurement'. **[6]**

OR

Write a note on liquid filled thermometer.

b) When input voltage of an instrument changes from 10V to 12V, the corresponding output voltage changes from 50V to 60V. What will be the sensitivity of the instrument? **[4]**

Q4) **Answer the following :**

a) Explain different types of classification of transducers. **[6]**

OR

What is thermister? What is NTC and PTC.

b) The surface area of a cylinder is given by $2\pi h$ for a cylinder of height 5cm and radius 1cm, find the percentage error in the measurement of surface area with an instrument of least count 0.1mm. **[4]**

Q5) **Write short note on any four of the following :** **[10]**

a) Seebeck effect
b) Buffer amplifier
c) Corrugated Diaphragm
d) High pass filter
e) Linear potentiometer
f) Temperature scales

Total No. of Questions : 5]

SEAT No. :

PD-2676

[Total No. of Pages : 2

[6467]-306
S.Y. B.Sc.
CHEMISTRY
CH - 301 : Physical & Analytical Chemistry
(2019 Pattern) (CBCS) (Semester - III) (23131)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

1) ***Q. 1 is compulsory.***
2) ***Solve any Three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***

Q1) **Write any five of the following :** **[5]**

a) Define adsorbent.

b) What is absolute error.

c) Define mixed indicator.

d) Define order of reaction.

e) What is titration curve.

f) Define rate constant.

Q2) a) Write any two of the following : **[6]**

i) How will you classify error? Give example.

ii) Discuss the titration curve between Fe^{2+} and Ce^{+4} ions.

iii) What is zero order reaction. Explain the characteristics of zero order reaction.

b) Derive the equation $k = Ae^{-Ea/RT}$ **[4]**

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

i) Distinguish between physical adsorption & chemisorption.

ii) Explain the titration curve for strong acid & strong base. Give the selection of suitable indicator.

iii) Discuss the various factors that affect the rate of reaction.

b) For a certain reaction of 1^{st} order half life period is 50 minutes. How long will it take for the reaction to 80% completed?

P.T.O.

Q4) a) Answer any two of the following : **[6]**

i) Discuss characteristics of second order reaction.

ii) Explain the terms

A) Best indicator

B) End point

C) Redox titration

iii) Discuss the various application of adsorption.

b) Find the pH of solution after adding 10 ml of 0.1 N NaOH to 25 ml 0.1 N CH_3COOH solution in the titration. **[4]**

Q5) Write any Four of the following : **[10]**

a) Write short note on Freundlich adsorption Isotherm.

b) Explain the limitations of analytical methods.

c) Explain the theory of acid - base titration.

d) What is mean by standard solution? How will you prepare 1 N NaOH. Explain.

e) Explain the neutralisation curve for weak acid & strong base titration.

f) Write a note on minimization of errors.

♦ ♦ ♦

Total No. of Questions : 5]

SEAT No. :

PD-2677

[Total No. of Pages : 3

[6467]-307
S.Y. B.Sc.
CHEMISTRY
CH - 302 : Inorganic and Organic Chemistry
(2019 Pattern) (CBCS) (Semester - III) (23132) (Paper - II)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates :

1) ***Q. 1 is compulsory.***
2) ***Solve any Three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Figures to the right indicate full marks.***

Q1) **Solve any five of the following :** **[5]**

a) Define the term non-bonding molecular orbital.

b) Write the mathematical formula of bond order calculation of MOT.

c) Define the term coordination number.

d) Draw the structure of benzaldehyde.

e) Define and statement of Markovikov's rule.

f) Draw the structure of β - naphthol.

Q2) a) Answer any two of the following : **[6]**

i) Give the assumptions of MOT.

ii) Draw energy level diagram of N_2 molecule and calculate the stabilization or energy evolved.

iii) What are aromatic compounds? Discuss Huckel's rule of aromaticity with suitable example.

b) Attempt the following : **[4]**

i) What are alkylhalide? Give it's classification with suitable example.

ii) Distinguish between metal chelate and metal complex.

P.T.O.

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

i) Draw Modigram of Li_2 molecule and calculate bond order and explain magnetic nature.

ii) Difference between atomic orbital and molecular orbital.

iii) What is lucas reagent? How will you distinguish primary secondary and tertiary alcohols.

b) Attempt the following : **[4]**

i) Give the molecular orbital configuration of C_2 molecule and calculate stabilization of energy evolved.

ii) Identify the product A and B and rewrite the reaction.

$$H_3C - CH_2 - B_r \xrightarrow[\text{Alcohol}]{KOH} (A) \xrightarrow{H_2 | Ni} (B)$$

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

i) Explain the bonding in HF molecule according to MO theory. Comment the magnetic property of the molecule.

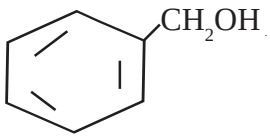
ii) What is SN^1 reaction? Discuss the meachanism of SN^1 reaction with suitable example.

iii) Write note on Schotten Boumann reaction.

b) Attempt the following : **[4]**

i) Calculate stabilization energy and bond order of H_2 molecule.

ii) Identify the reaction product 'A' and 'B' and rewrite the reaction.



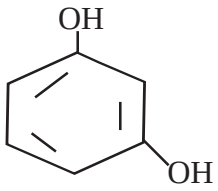
$$\xrightarrow[\text{Pyridine}]{SOCl_2} (A) \xrightarrow{KCN} (B)$$

Q5) Attempt any Four of the following : **[10]**

a) Distinguish between σ MO's and Π Mo's.

b) Give the assumptions of Werner's theory.

c) Identify the reaction product 'A' and 'B' and rewrite the reaction.



$$+CH_3CN \xrightarrow[\text{or } ZnCl_3]{HCl} (A) \xrightarrow[\text{ReFlux}]{H_2O} (B)$$

d) Write short note on Aromaticity.

e) What are ethers? How are they classified?

f) Write a short note on Benzyne mechanism.

Total No. of Questions : 5]

SEAT No. : ____

PD-1490

[Total No. of Pages : 2

[6467]-308
S.Y. B .Sc.
BOTANY
BO - 231 : Taxonomy of Angiosperms and Plant Ecology
(2019 Pattern) (CBCS) (Semester - III) (Paper - I) (23141)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Attempt any three questions from Q.2 to Q.5.***
3) ***Questions No.2 to Question No.5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

Q1) **Attempt Any Five of the following :** **[5]**

a) What is exploration?

b) Define ecology.

c) What is polynomial name?

d) What is typification?

e) Write floral formula of family annonaceae.

f) What is vivipary?

Q2) a) Give broad outline of Bentham and Hookers system of classification of seed plants. **[6]**

b) Explain economic importance of family apocynaceae. **[4]**

Q3) a) Write distinguishing characters, floral formula and economic importance of family solaneceae. **[6]**

b) What is binomial nomenclature? Give its advantages. **[4]**

P.T.O.

Q4) a) What are hydrophytes? Give their adaptive external and internal features. **[6]**

b) Explain briefly concept of biodiversity hotspots. **[4]**

Q5) **Write short notes on Any Four of the following :** **[10]**

a) Importance of Taxonomy.

b) Concept of alpha diversity.

c) APG system of classification.

d) Wet land ecosystems.

e) Flowers of Nyctaginaceae.

f) Limitations of linnaeus system of classification.

Total No. of Questions : 5]

SEAT No. : ____

PD-1491

[Total No. of Pages : 2

[6467]-309
S.Y. B .Sc.
BOTANY
BO - 232 : Plant Physiology
(2019 Pattern) (CBCS) (Semester - III) (Paper - I) (23142)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Attempt any three questions from Q.2 to Q.5.***
3) ***Questions No.2 to Question No.5 carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat labelled diagrams wherever necessary.***

Q1) **Attempt Any Five of the following :** **[5]**

a) Define ascent of sap.

b) What is nitrogen fixation?

c) Define seed germination.

d) What is plant physiology?

e) Mention any two internal factors that influence rate of water absorption.

f) What is photoperiodism?

Q2) a) What is transpiration? Describe factors affecting rate of transpiration. **[6]**

b) Explain the types of seed dormancy. **[4]**

Q3) a) Explain non-symbiotic nitrogen fixation by Blue Green Algae (BGA). **[6]**

b) Explain active osmotic absorption of water. **[4]**

P.T.O.

Q4) a) What is vernalization? Explain any four applications of vernalization. **[6]**

b) Describe Guttation. **[4]**

Q5) **Write short notes on Any Four of the following :** **[10]**

a) Scope of plant physiology.

b) Denitrification.

c) Short Day Plants (SDP)

d) Any one method of breaking seed dormancy.

e) Types of transportation.

f) Path of ascent of sap.

Total No. of Questions : 5]

SEAT No. :

PD-1492

[Total No. of Pages : 2

[6467]-310
S.Y. B .Sc.
ZOOLOGY
ZO - 231 : Animal Diversity - III
(2019 Pattern) (CBCS) (Semester - III) (Paper - I) (23151)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) **Solve any five of the following :** **[5]**

a) Define Vertebrata.

b) What is Urodela?

c) Define chondrichthyes.

d) Give functions of scroll valve.

e) What is homocercal fin?

f) Give an example of hemichordata.

Q2) a) Give an account of origin and ancestry of chordata with Echinoderm theory. **[6]**

OR

With neat labelled diagram describe the external characters of scoliodon.

b) Explain the division Agnatha with suitable example. **[4]**

Q3) a) Describe the digestive system of scoliodon. **[6]**

OR

Write the salient features of osteichthyes and gives it's two examples.

b) Give characteristics features of subphylum urochordata with suitable example. **[4]**

P.T.O.

Q4) a) Sketch and label dorsal view of brain of Scoliodon. **[6]**

OR

What is parental care? Describe any three ways in which amphibians protect their eggs.

b) Give the economic importance of Scoliodon. **[4]**

Q5) **Write short notes on any four of the following :** **[10]**

a) Salient features of Cephalochordata.

b) Placoid scale of Scoliodon.

c) Types of fins in fishes.

d) Wolffian duct.

e) Working of heart in Scoliodon.

f) Habit and habitat of Scoliodon.

Total No. of Questions : 5]

SEAT No. : ____

PD-1493

[Total No. of Pages : 2

[6467]-311
S.Y. B .Sc.
ZOOLOGY
ZO - 232 : Applied Zoology - I
(2019 Pattern) (CBCS) (Semester - III) (Paper - II) (23152)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) **Solve any five of the following :** **[5]**

a) What is moriculture?

b) Give any two examples of veterinary pest.

c) What is biological name of eri silkworm?

d) What is biological name of red cotton bug?

e) What is sorting of cocoon?

f) What is mechanical pest control?

Q2) a) Describe marks of identification, nature of damage & control measure of blister beetle. **[6]**

OR

Explain Biotechnological & Biomedical applications of silk.

b) Describe cyanogas pump. **[4]**

Q3) a) Describe bed cleaning methods of silkworm. **[6]**

OR

Explain physical & pheromonal control measures of pest.

b) Explain stiffling & deflossing as a post harvest processing of cocoon. **[4]**

P.T.O.

Q4) a) Describe marks of identification, nature of damage & control measures of brinjal fruit borer. **[6]**

OR

Describe life cycle of Bombyx mori.

b) Describe fertilizer schedule of irrigated mulberry cultivation. **[4]**

Q5) **Write short notes on any four of the following :** **[10]**

a) Branch cutting method.

b) Tasar silkworm.

c) Mounting.

d) Biological control.

e) Control measures of pulse beetle.

f) Nature of damage caused by rat.

Total No. of Questions : 5]

SEAT No. :

PD-1494

[Total No. of Pages : 2

[6467]-312
S.Y. B.Sc.
GEOLOGY
GL 211 : Structural Geology
(2019 Pattern) (Semester - III) (23161)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Question No.2 to Question No5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) **Answer the following (any five) :** **[5]**

a) Define DIP.

b) What is heave?

c) Strike & dip symbol for inclined and horizontal strata.

d) Draw anticline symmetrical fold.

e) Define stress.

f) What is back bearing?

Q2) **Answer the following :**

a) Define fault. Give the terminologies associated with fault plane. **[6]**

b) Explain geometric classification of joints. **[4]**

Q3) **Answer the following :**

a) Explain attitude of planer feature. Define Rate and plunge. **[6]**

b) Explain the parts of folds. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Explain rock deformation. Explain Brittle & Ductile deformation. **[6]**

b) Explain factor controlling behaviour of material :

i) Temperature ii) Pressure **[4]**

Q5) **Write short notes on any four** **[10]**

a) Calculation of net slip

b) Types of shear zone

c) Brunton compass

d) Draw strain - stress diagram

e) Reckies principle.

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Total No. of Questions : 5]

SEAT No. :

PD-1495

[Total No. of Pages : 2

[6467]-313
S.Y. B.Sc.
GEOLOGY
GL 212 : Palaeontology
(2021 Pattern) (Semester - III) (Regular) (Paper - II)
(23162 B)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Question No.2 to Question No.5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) **Answer Any five of the following questions in 2-3 lines.** **[5]**

a) Enlist the types of coiling in Gastrapoda shell with example.

b) Define Microfossils.

c) Name the epochs of Quaternary period.

d) Define Ichnology.

e) Give any two morphological characters of Glossopteris.

f) Give any two characteristic features of Phylum Brachiopoda.

Q2) **Answer the following :**

a) What caused the Cambrian Explosion. **[6]**

b) Describe the major mass extinctions of geological time. **[4]**

Q3) **Answer the following :**

a) Explain modes of preservation of fossils. **[6]**

b) Distinguish between the Nautilvs and Ammonoids. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Explain the types of coiling in foraminifera with diagrams. **[6]**

b) Write a note on Corona of a typical echinoid test. **[4]**

Q5) **Write a short note on any four of the following :** **[10]**

a) Diatoms.

b) Acid treatment for liberating microfossils.

c) Symmetry of Brachiopod shell.

d) Stromatolites.

e) Conditions necessary for fossilisation.

f) Uses of Index fossils.

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Total No. of Questions : 4]

SEAT No. :

PD-1496

[Total No. of Pages : 2

[6467]-314

S.Y. B .Sc.

STATISTICS

ST - 231 : Discrete Probability Distributions and Time Series

(2019 Pattern) (Semester - III) (23171)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

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

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

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

i) If X $\rightarrow$ NB (k,p) then for k = 1 the distribution of X is

a) Geometric b) Binomial

c) Poisson d) Discrete Uniform

ii) If $(X_1, X_2, X_3) \rightarrow$ MD (l0, 3/8, 4/8, 1/8) then E(x) is

a) 30/8 b) 10/8

c) 3/10 d) 3/8

iii) If the model is multiplicative sum of quarterly seasonal indices is

a) 1200 b) 700

c) 400 d) 0

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

i) If $X_T \rightarrow$ P(m) truncated below at X = 0 then E (X_T) is m.

ii) If $(X_1, X_2, ...X_k) \rightarrow$ MD $(n, P_1, P_2, ...P_k)$ then Corr (X_i, X_j) is always negative.

P.T.O.

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

a) State and prove Poisson approximation to negative binomial distribution.

b) Define binomial distribution truncated below at X = 0 and find its mean.

c) Explain the method of moving average of estimating trend values.

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

a) State and prove the relation between geometric distribution and negative binomial distribution.

b) If $(X_1,X_2,.....X_k) \rightarrow MD\ (n,P_1, P_2,.....P_k)$ then find the conditional distribution of X_i given $X_i + X_j = r$.

c) Describe the method of ratio to trend for computing seasonal indices.

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

a) i) Estimate the trend for 2018 by fitting linear equation for the following times series. **[7]**

Year	2009	2010	2011	2012	2013	2014	2015
Profit (in 100 Rs.)	800	1000	1050	980	1080	1030	1200

ii) Explain what is truncated probability distribution with illustration. **[3]**

b) i) If $(X_1, X_2, X_3) \rightarrow MD\ (6, 0.20, 0.50, 0.30)$ then find correlation and dispersion matrix of (X_1, X_2, X_3) and also obtained their ranks. **[7]**

ii) State any three utility of time series. **[3]**

Total No. of Questions : 4]

SEAT No. : ____

PD-1497

[Total No. of Pages : 3

[6467]-315
S.Y. B.Sc.
STATISTICS
ST 232 : Continuous Probability Distribution
(2019 Pattern) (Semester - III) (23172)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

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

Q1) Attempt each of the following :

a) Choose the correct alternative in each of the following. **[1 each]**

i) If $f(x,y)$ is the joint probability density function (p.d.f) of random variable (r.v) (x, y) then marginal p.d.f of r.v Y is

A) $\int_y f(x,y)dy$ B) $\int_x f(x,y)dy$

C) $\int_x f(x,y)dx$ D) $\int_y f(x,y)dx$

ii) Mean of uniform r.v. is 4 then median of such a r.v. is

A) less than 4 B) greater than 4

C) equal to 4 D) not equal to 4

iii) If $X \rightarrow Exp(2)$ then Var(X) is

A) 4 B) ¼

C) 2 D) ½

b) State whether each of the following statements is true or false. **[1 each]**

i) If $F(x, y)$ denotes joint cumulative destribution function (c.d.f.) of r.v. (x,y), $F_1(x)$ & $F_2(y)$ denote marginal c.d.f. of X and Y respectively then $F(x, \infty) = F_1(x)$.

ii) The first quartile of $U(a, b)$ distribution is $\frac{(a+b)}{4}$.

P.T.O.

Q2) Attempt <u>any two</u> of the following : **[5 each]**

a) Derive cumulant generating function (c.g.f.) of $N(\mu, \sigma^2)$ distribution. Hence find its third order central moment.

b) Obtain the distribution function of exponential distribution. Hence or otherwise obtain the distribution function of $Y = \min(X_1, X_2)$ where X_1 and X_2 are independent identically distributed exponential r.v. with mean equal to 1.

c) Probability density function of r.v. X is

$f(x) = 1 \quad ; \ 0 \leq x \leq 1$

$= 0 \quad ;$ otherwise

Find $E(e^{tx})$. Hence find $E(X^2)$

Q3) Attempt <u>any two</u> of the following : **[5 each]**

a) Suppose (x,y) is a joint r.v. with joint p.d.f

$f(x, y) = 3(x + y) \ ; \ 0 \leq x \leq 1, \ 0 \leq y \leq 1, \ 0 \leq x + y \leq 1$

$= 0 \quad$; otherwise

Find marginal p.d.f. of r.v. X and Y. comment on independence of r.v. X and Y.

b) Lower and upper quartiles of certain $N(\mu, \sigma^2)$ distribution are 79.67 and 80.34 respectively. Find μ and σ^2 Also find $P(78 < X < 82)$

c) A r.v.X has p.d.f.

$f(x) = 2x \ ; \ 0 < x \leq 1$

$= 0 \quad ;$ otherwise

Find E(X) and E(1/X)

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

a) i) Suppose X and Y are independent r.v.s having joint p.d.f.

$f(x, y) = e^{-(x+y)} \ ; \ 0 \leq x < \infty, \ 0 \leq y < \infty$

$= 0 \quad$; otherwise

Show that $U = X + Y$ and $V = \frac{X}{Y}$ are independent random variables. **[7]**

ii) Define $U(a, b)$ distribution. Obtain its' third quartile. **[3]**

b) i) If X and Y are independent standard normal variables then show that X + Y and X – Y are uncorrelated and hence Find Var(2(X+Y) + 4(X – Y) **[7]**

ii) For joint r.v(X, Y)·E(X|Y) = 4 + 5Y. Find E(X) if E(Y) = 10 **[3]**

Total No. of Questions : 5]

SEAT No. :

PD1498

[Total No. of Pages : 2

[6467]-316

S.Y.B.Sc. (Regular)

GEOGRAPHY

GG-231 : Environmental Geography-I

(2019 Pattern) (CBCS) (Semester-III) (Paper-I) (23181)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Use of map stencil is allowed.***

Q1) Answer the following questions in 20 words (any five). **[5]**

a) Define Environmental Geography.

b) Write any two examples of trees found in equatorial ecosystem.

c) What is possibilism?

d) Give any two natural causes of climate change.

e) What was the aim of Chipko movement?

f) What was the famous slogen used in 'Narmada Bachao Andolan'?

Q2) a) Answer the following questions in 100 words: (any two) **[6]**

i) Describe the structure of an ecosystem.

ii) Explain 'Save Silent Valley Movement'.

iii) Explain different causes of Air pollution.

b) Answer the following questions in 150 words: (any one) **[4]**

i) Explain the concept of food chain in detail.

ii) Explain the term Biodiversity Depletion.

P.T.O.

Q3) a) Answer the following questions in 100 words: (any two) **[6]**

i) Describe the significance of 'Narmada Bachao Andolan'.

ii) Write the different causes of water pollution.

iii) Explain the nature of 'Environmental Geography'.

b) Answer the following questions in 150 words: (any one) **[4]**

i) Explain different causes of 'Ozone Depletion'.

ii) Give an account of Human activities in mountain region.

Q4) a) Answer the following questions in 100 words: (any two) **[6]**

i) Describe the significance of 'Environmental Geography'.

ii) Describe Neo-determinism.

iii) Explain the role of World Bank in Narmada Bachao Andolan.

b) Answer the following questions in 150 words: (any one) **[4]**

i) Explain the Chipko Movement in detail.

ii) Explain human activities in 'Desert Region'.

Q5) Write short notes on the following: (any Four) **[10]**

a) Equatorial ecosystem.

b) Problems of 'Desert Region'.

c) Effects of Nuclear Pollution.

d) Causes of Noise pollution.

e) Energy crisis in India.

f) Environmental determinisim.

Total No. of Questions : 5]

SEAT No. :

PD1499

[Total No. of Pages : 2

[6467]-317
S.Y.B.Sc. (Regular)
GEOGRAPHY
GG-232 : Geography of Maharashtra (Physical-I)
(2019 Pattern) (Semester - III) (23182) (Paper - II)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Attempt any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Use of map stencil is allowed.***

Q1) Answer the following questions in 20 words (Any Five) **[5]**

a) Who became the first peshwa?

b) Name the heighest peak of Sahyadri in Maharashtra.

c) What is soil erosion?

d) When Deccan Trap is formed?

e) What is the height of Kalsubai peak?

f) Mention the latitudinal and longitudinal extension of Maharashtra.

Q2) a) Answer the following questions in 100 words (Any two). **[6]**

i) Discuss the administrative set up in Maharashtra during the British period.

ii) Give a detailed account of Maharashtra Plateau.

iii) Explain the significance of monsoon in Maharashtra.

b) Answer the following question in 150 words (Any one) **[4]**

i) Describe political background of Maharashtra.

ii) Discuss 'Farm Pond scheme' implemented by the government of Maharashtra.

P.T.O.

Q3) a) Answer the following questions in 100 words (Any Two) **[6]**

i) Explain the tributeries of upper Godavari.

ii) Explain climatic characteristics of Maharashtra.

iii) Explain the effects of deforestation.

b) Answer the following question in 150 words (Any one) **[4]**

i) What are the major characteristics of East-flowing rivers in Maharashtra?

ii) Explain an effect of monsoon over drinking water in Maharashtra.

Q4) a) Answer the following questions in 100 words. (any two) **[6]**

i) Describe Precambrian rocks.

ii) Give an account of rivers of the Konkan.

iii) Explain temperature distribution in Maharashtra.

b) Answer the following question in 150 words (Any one) **[4]**

i) Explain the location and history of the state of Maharashtra.

ii) Give an account of Tropical and subtropical evergreen forest in Maharashtra.

Q5) Write short notes on the following. (Any four) **[10]**

a) The Deccan Basalt province.

b) The Satmala-Ajanta ranges.

c) Monsoon affect on Maharashtra agriculture.

d) Climatic diversity in Maharashtra.

e) Overgrazing.

f) Agroforestry.

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Total No. of Questions : 5]

SEAT No. :

PD-1500

[Total No. of Pages : 2

[6467]-318
S.Y. B.Sc.
MICROBIOLOGY
MB-231: Medical Microbiology & Immunology (Theory)
(2019 Pattern) (CBCS) (Semester - III) (23191)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) Solve any five of the following: **[5]**

a) Define selective toxicity

b) State true or false :

Antibody is also known as immunoglobulin.

c) Define incubation period.

d) What is synergism?

e) _____ are known as incomplete antigens.

f) MIC stands for :

Q2) a) Describe the following [Any two] : **[6]**

i) Antigenic characters of E.coli.

ii) Medicolegal applications of blood group.

iii) Myeloid lineage.

b) Write morphological cultural and biochemical characteristics of candida. **[4]**

Q3) a) Describe the following [Any two] : **[6]**

i) Acquired immunity.

ii) Antibiotic misuse.

iii) In-activated vaccines.

b) With suitable diagram describe biochemistry of blood group substances. **[4]**

P.T.O.

Q4) a) Describe the following [any two] : **[6]**

i) Attenuated vaccines.

ii) MRSA

iii) Latest immunization schedule in India.

b) Describe in detail prophylaxis and chemotherapy for dermatophytes. **[4]**

Q5) Write short notes on any four : **[10]**

a) Lymphocyte types.

b) LD50

c) Rh blood group system.

d) Selective toxicity.

e) Passive immunization.

f) Antibiotic sensitivity.

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Total No. of Questions : 5]

SEAT No. :

PD-1501

[Total No. of Pages : 2

[6467]-319
S.Y. B.Sc.
MICROBIOLOGY
MB-232: Bacterial Physiology and Fermentation Technology
(2019 Pattern) (CBCS) (Semester - III) (Paper - II) (23192)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***
4) ***Draw neat labelled diagrams wherever necessary.***
5) ***Figures to the right indicates full marks.***

Q1) Solve any five of the following: **[5]**

a) Define Cofactors

b) Define Glycolysis

c) Phosphofructokinase belongs to _____ class of enzymes.

d) Write name of two microorganisms used for industrial production of antibiotics.

e) What is Fermentation?

f) Culture used for inoculum production should be genetically stable __ state True/False

Q2) a) Attempt the following [any two] **[6]**

i) Write different components of growth media for industrial fermentation.

ii) Explain Transition state theory.

iii) Describe advantages of batch fermentation.

b) Write ATP generating reactions of glycolysis. **[4]**

P.T.O.

Q3) a) Attempt the following [any two] **[6]**

i) Describe effect of temperature on enzyme activity.

ii) Explain techniques used to isolate antibiotic producers.

iii) Describe significance of pentose phosphate pathway.

b) What is lyophilization? Write its applications. **[4]**

Q4) a) Attempt the following [any Two] **[6]**

i) Explain with the help of example enzyme inhibitors.

ii) Describe amphibolic nature of TCA cycle.

iii) Describe how temperature is monitored & controlled during fermentation.

b) What are biopesticides? Describe their types. **[4]**

Q5) Write short notes on (any four) : **[10]**

a) Oxidoreductases

b) ED pathway

c) Active site

d) Consequences of contamination during fermentation.

e) Antifoam agents.

f) Ideal characters of probiotic microorganisms.

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Total No. of Questions : 5]

SEAT No. :

PD1502

[Total No. of Pages : 2

[6467]-320

S.Y.B.Sc. (Regular)

NANOSCIENCE & NANOTECHNOLOGY

NS-231 : Physical Techniques for Synthesis of Nanomaterials

(2019 Pattern) (Semester-III) (Credit System) (Paper-I)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions Q.2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***
4) ***Draw neat and labeled diagram wherever necessary.***
5) ***Figure to the right indicate full marks.***

Q1) Attempt any five of the following. **[5]**

a) Define Ultrasonic Exfoliation?

b) What is Sputter deposition?

c) Draw the neat labelled diagram of Ball Milling.

d) What is the influence of pH on biological synthesis of nanoparticles?

e) Give the two mechanical techniques for synthesis of nanomaterials.

f) Give any two applications of nanoparticles.

Q2) a) Attempt any one of the following. **[6]**

i) Explain laser assisted exfoliation.

ii) Explain ion-beam techniques

b) Explain Biological synthesis of nanomaterials by using plants. **[4]**

P.T.O.

Q3) a) Attempt any one of the following. **[6]**

i) Explain electric arc deposition.

ii) Explain Ball Milling technique.

b) Explain influence of rectant concentration biological synthesis of metal nanoparticles. **[4]**

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

i) Explain mechanical exfoliation using scotch tape.

ii) Explain vaccume evaporation.

b) Explain synthesis of palladium and platinum nanoparticles from plant extract. **[4]**

Q5) Write short notes on any Four of the following. **[10]**

a) Sputter deposition

b) Ultrasonic exfoliation

c) Molecular beam epitoxy

d) Vaccume evaporation

e) Electric arc deposition

f) Ball-Milling technique

Total No. of Questions : 5]

SEAT No. : ____

PD1503

[Total No. of Pages : 2

[6467]-321
S.Y.B.Sc. (Regular)
NANOSCIENCE AND NANOTECHNOLOGY
NS-232 : Properties of Nanomaterials (Physical, Chemical, Optical & Magnetic)
(2019 Pattern) (Semester - III) (23262)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***
4) ***Draw neat & labeled diagram wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) Attempt any FIVE of the following. **[5]**

a) What is mean by surface energy?

b) What is cathodoluminescence?

c) Define Neel relaxation temperature.

d) Write down different types of hardness.

e) What is absorption?

f) Define ferromagnetism.

Q2) a) Attempt any ONE of the following. **[6]**

i) Explain superparamagnetism in brief.

ii) Explain SEM with proper diagram.

b) What is exciton? Explain types of excitons. **[4]**

Q3) a) Attempt any ONE of the following. **[6]**

i) Explain giant magneto resistance.

ii) With block diagram explain photoluminescence spectroscopy.

b) Explain the terms histopathology and immunohistochemistry. **[4]**

P.T.O.

Q4) a) Attempt any ONE of the following. **[6]**

i) With neat labeled diagram explain X-ray fluorescence spectroscopic method.

ii) Explain diamagnetism in detail.

b) Explain gastrointestinal tract. **[4]**

Q5) Write a short notes on any FOUR of the following. **[10]**

a) Colossal magneto resistance.

b) Effect of magnetic field in superparamagnetism.

c) Strength of nanomaterials.

d) Bohr radius.

e) Antiferromagnetism.

f) Electroluminescence.

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Total No. of Questions : 5]

SEAT No. :

PD1504

[Total No. of Pages : 2

[6467]-322

S.Y. B.Sc. (Regular)

ELECTRONIC SCIENCE

EL - 231 : COMMUNICATION ELECTRONICS

(CBCS 2019 Pattern) (Semester-III)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***

Q1) Solve any Five of the following : **[5]**

a) Define modulation index in AM.

b) What is mean by carrier frequency?

c) Define the baud rate in communication system.

d) What is mean by FDM?

e) Give the advantages of PAM.

f) What is mean by full duplex communication system.

Q2) Answer the following :

a) i) Explain the sampling theorem. **[2]**

ii) Write a note on need of Modulation. **[4]**

b) Explain the block diagram of communication system. **[4]**

P.T.O.

Q3) Answer the following :

a) i) Derive the equation of Bandwidth for FM. **[2]**

ii) Define PSK. Explain the diagram of QPSK. **[4]**

b) Explain the working of FM generator using varactor diode. **[4]**

Q4) Answer the following :

a) i) Define noise is communication system. Give any two importance of S/N ratio. **[2]**

ii) Draw and explain the block diagram of MODEM. **[4]**

b) In frequency modulated signal f_m = 20KHz and fd = 5KHz, calculate the bandwidth. **[4]**

Q5) Write short note on any Four of the following : **[10]**

a) What are the advantages & disadvantages of PCM?

b) Explain the demodulation.

c) What is the difference between TDM & FDM?

d) Explain any two application of communication system.

e) The frequency deviation in FM signal is 5KHz. Calculate the carrier swing.

f) Write a note on single side band communication techniques.

Total No. of Questions : 5]

SEAT No. :

PD1505

[Total No. of Pages : 2

[6467]-323
S.Y. B.Sc. (Regular)
ELECTRONIC SCIENCE
EL-232 : Digital System Design
(2019 Pattern) (Credit System) (Semester - III) (Paper - II) (23222)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Q. No. 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***

Q1) Attempt any five of the following : **[5]**

a) Draw the structure of 3 inputs K-map.

b) Which gate is used for event detector?

c) Define accuracy in case of DAC.

d) Draw state diagram of mod-5 counter.

e) Write down excitations table of J-K flip-flop.

f) How many voltage comparators are required to design 4 bit flash ADC?

Q2) Answer the following :

a) i) Define any two applications of DAC. **[2]**

ii) Draw and explain 3-bit down counter. Give its timing diagram. **[4]**

b) Find the output voltages of 4-bit R-2R ladder if digital inputs are **[4]**

i) 0001

ii) 1000

if $V_{ref} = 16V$

P.T.O.

Q3) Answer the following :

a) i) Define logic family & give classification of logic family. **[2]**

ii) Explain 4 bit parallel adder with diagram. **[4]**

b) Draw the circuit diagram CMOS invertor. Explain its action. **[4]**

Q4) Answer the following :

a) i) Give two advantages of $K\text{-}_{Map}$ over boolean algebra. **[2]**

ii) Explain with logic diagram MOD-10 counter using J-K. flip-flop. **[4]**

b) Obtain the logical expression for segment b for BCD to 7 segment decoder to drive common anode display. **[4]**

Q5) Attempt any four of the following : **[10]**

a) Draw and explain block diagram of sequential circuit.

b) Describe state table & state diagram.

c) Explain counter type ADC with diagram.

d) Explain any two specification of DAC.

e) Write a note on frequency measurement system.

f) Write the steps of design combinational logic circuit.

Total No. of Questions : 5]

SEAT No. : [ ]

PD1506

[Total No. of Pages : 2

[6467]-324
S.Y.B.Sc. (Regular)
PSYCHOLOGY
Psychology of Adjustment
(2019 Pattern) (Semester - III) (23201) (Paper - I)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions from 2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Define Happiness.

b) What is assertiveness?

c) State the types of communication.

d) Name the types of adjustment.

e) Define self control.

f) Name the types of occupational hazards.

Q2) a) Describe the various component of communication process. **[6]**

OR

Explain the effective parenting styles.

b) Justify that case study method is an appropriate approach to study behaviour. **[4]**

Q3) a) Discuss the sound study habit method. **[6]**

OR

Examine the Holland's career choice model.

b) Categorize the types of punishment and its effects. **[4]**

P.T.O.

Q4) a) Explain the self control executing and evaluating program. **[6]**

OR

Describe the areas of marital adjustment.

b) Analyze the constructive conflict resolution techniques. **[4]**

Q5) Write short notes on any four of the following. **[10]**

a) Empiricism approach.

b) Process of communication.

c) Permissive parenting

d) Effects of unemployement

e) Nature of assertiveness

f) Interpersonal communication

Total No. of Questions : 5]

SEAT No. : ____

PD-1507

[Total No. of Pages : 2

[6467]-325
S.Y. B.Sc.
PSYCOLOGY
Research Methods in Behavioral Sciences
(2019 Pattern) (Paper - II) (Semester - III) (23202)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Q. No.2 to Q. No.5.***
3) ***Questions 2 to 5 carry equal marks.***

Q1) **Solve any Five of the following :** **[5]**

a) Define Scientific Research.

b) State the types of data collections.

c) Define psychological test.

d) Define Sampling.

e) What is Universe?

f) Give the meaning of interpretation.

Q2) a) Explain the various types of probability sampling. **[6]**

OR

Describe the types and advantages of obesrvational data collection method.

b) Differentiate between experimental and non-experimental research. **[4]**

Q3) a) Discuss the Stages of Research. **[6]**

OR

Explain in detail the structure of research report.

b) Assess the need of interpretation of data in research. **[4]**

P.T.O.

Q4) a) Explain the goals of scientific research. **[6]**

OR

Describe the types of non Probability sampling.

b) Compare the Primary and Secondary data in research. **[4]**

Q5) **Write short notes on any four of the following :** **[10]**

a) Disadvantages of secondary data.

b) Characteristics of psychological test.

c) Case study.

d) Characteristics of scientific research.

e) Uses of computer in research.

f) Uses of psychological tests.

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Total No. of Questions : 5]

SEAT No. : ____

PD1508

[Total No. of Pages : 2

[6467]-326

S.Y. B.Sc. (Regular)

ENVIRONMENTAL SCIENCES

EVS - 231 : Ecology and Ecosystem

(2019 Pattern) (Semester - III) (Paper - I) (23241)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from question no.2 to question no.5.***
3) ***Question no.2 to question no.5 carry equal marks.***

Q1) Answer any five of the following. **[5×1=5]**

a) What are the types of food chain?

b) Mention any two examples of aquatic ecosystem?

c) Define the term - succession?

d) What is food web?

e) Define the term - Ecological niche?

f) What is invasion in the process of succession?

Q2) Answer the following.

a) Describe energy flow in ecosystem? **[6]**

b) Describe types of habitat in ecology? **[4]**

Q3) Answer the following.

a) Describe phosphorus cycle with diagram? **[6]**

b) Illustrate the concept of carrying capacity? **[4]**

P.T.O.

Q4) Answer the following.

a) Describe characteristics of community ecology. **[6]**

b) Write impacts of human activities on biogeochemical cycles? **[4]**

Q5) Write short notes on any four of the following. **[10]**

a) Causes of succession.

b) Population growth curves.

c) Macro and micro nutrients.

d) Primary productivity of ecosystem.

e) Interdesciplinary nature of ecology.

f) Ecological pyramids of number.

Total No. of Questions : 5]

SEAT No. :

PD1509

[Total No. of Pages : 2

[6467]-327
S.Y. B.Sc. (Regular)
ENVIRONMENTAL SCIENCE
EVS-232 : Natural Resources Conservation and Their Management
(2019 Pattern) (Semester - III) (Paper - II) (23242)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Solve any three from questions Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***

Q1) Attempt any five of the following :

a) Define sustainable agriculture? **[1]**

b) What is soil erossion? **[1]**

c) What is Malnutrition? **[1]**

d) Define Aquifer? **[1]**

e) Give full form of EDP? **[1]**

f) What is shifting cultivation? **[1]**

Q2) Answer the following :

a) What are major problems associated with natural resources? **[6]**

b) What are protected areas? How they help in forest conservation? **[4]**

Q3) Answer the following :

a) What is Green Revolution? Discuss its impact in India? **[6]**

b) What is Rainwater Harvesting? How does it help in ground water recharge? **[4]**

P.T.O.

Q4) Answer the following :

a) What are the methods of flood and floodplain management? **[6]**

b) Explain the effects of soil erossion on the environment and agriculture. **[4]**

Q5) Write a short note on any four of the following : **[10]**

a) Problems associated with natural resources.

b) JFM

c) Need of mineral resources

d) Plastic pollution

e) Over use of Fertilisers

f) Increasing food demand

Total No. of Questions : 4]

SEAT No. :

PD1510

[Total No. of Pages : 1

[6467]-328
S.Y.B.Sc. (Regular)
DEFENCE AND STRATEGIC STUDIES
DS 201 : Science, Technology & National Security
(2019 Pattern) (Semester - III) (23231)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

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

Q1) Define the following questions. **[5×1=5]**

a) Define 'Technology'
b) What is Warfare?
c) State the information Technology.
d) What is the Cold War?
e) Define 'Science'

Q2) Write short notes on (any two) **[10]**

a) Technological warfare.
b) New challenges of National Security.
c) Artificial Technology.

Q3) Attempt the following questions (any two) **[10]**

a) State the relevance of Science & Technology in National Security.
b) Explain in detail the post Cold War era.
c) What are the Advantages of Foreign Collaboration?

Q4) Answer in details (any one) **[10]**

a) State in detail 'Military Technology'
b) Explain in detail Comprehensive approach to putting science and technology.

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Total No. of Questions : 4]

SEAT No. : ____

PD-1511

[Total No. of Pages : 2

[6467]-329

S.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS 202 : Military Geography & Geopolitics

(2019 Pattern) (Semester - III) (23232)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

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

Q1) **Define the following questions :** **[1 × 5 = 5]**

a) Define strategic features.

b) Define Land-Locked States.

c) Define Nation.

d) Define water topography

e) Define Nation-State.

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

a) Hydrography

b) Land Power Theory

c) Desolate area

Q3) **Attempt the following questions (Any Two) :** **[10]**

a) Explain the Meaning & Concepts A.T. Mahan's survey strategy.

b) State the Problems of Land-Locked and Buffer States.

c) Explain theTactics - Definition, Meaning & Concepts.

P.T.O.

Q4) **Answer in details (Any One) :** **[10]**

a) Discuss in detail the Grand Strategy – Meaning, Definition and Formation of Grand Strategy.

b) Explain the political objectives of RimLand Theory.

Total No. of Questions : 4]

SEAT No. : ____

PD-1512

[Total No. of Pages : 2

[6467]-330

S.Y. B .Sc.

DEFENCE AND STRATEGIC STUDIES

DS 203 : Contemporary Warfare

(2019 Pattern) (Semester - III) (23233)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

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

Q1) **Define the following questions :** **[1 × 5 = 5]**

a) Define Unconventional war.

b) What is international science?

c) Define Energy Security.

d) What is technology cooperation?

e) Define Contemporary Warfare.

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

a) SSTRO- Stabilisation, Security, Transition, and Reconstruction Operations (SSTRO).

b) Comprehensive Security

c) Hybrid War

Q3) **Attempt the following questions (Any Two) :** **[10]**

a) State the India and USA relations.

b) State the role of Science and Technology in National Security.

c) Explain the Meaning, Concept, Nature & Scope Contemporary Warfare.

P.T.O.

Q4) **Answer in details (Any One) :** **[10]**

a) Discuss in detail the new security environment of India.

b) Explain in detail Use of Modern Technology in Contemporary Warfare.

Total No. of Questions : 3]

SEAT No. :

PD1513

[Total No. of Pages : 1

[6467]-331
S.Y.B.Sc. (Regular)/B.Sc.(Computer Science/Biotechnology/ Animation)/B.C.A.
ENGLISH
AECC-II A : Language Communication - I
(Revised 2019 Pattern) (Credit System) (Semester - III) (23321)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

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

Q1) Attempt any one of the following in about 150-200 words. **[15]**

a) Comment on the title of the story A Shadow.

b) Describe the supernatural atmosphere in the poem La Bella Dame Sans Merci.

Q2) Attempt any two of the following in about 50-80 words. **[10]**

a) Write a dialogue between you and the college librarian for asking the permission to use the library for extra hours during the examination period.

b) Frame a dialogue on introducing your Teacher to your parents.

c) Write a dialogue on describing your daily routine to your friend.

Q3) Attempt any two of the following in about 50-80 words. **[10]**

a) Write a job Application for the post of a Data Analyst in a multinational company.

b) Write a Reseume for the post of Administrative Officerata Co-operative Bank.

c) Frame Five slides Power Point Presentation on Do's and Don't's of Group Discussion.

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Total No. of Questions : 3]

SEAT No. :

PD1514

[Total No. of Pages : 1

[6467]-332
S.Y. B.Sc. (Regular)
MARATHI (मराठी)
AECC-2B : उपयोजित मराठी
(2019 Pattern) (Semester - III) (23331)

वेळ : *2* तास*]* *[* एकूण गुण : *35*

सूचना:– *1)* सर्व प्रश्न सोडविणे आवश्यक आहेत.

2) उजवीकडील अंक प्रश्नांचे पूर्ण गुण दर्शवितात.

प्र.*1)* अ) खालीलपैकी कोणत्याही पाच प्रश्नांची उत्तरे 20 शब्दांत लिहा. **[5]**

i) भाषा म्हणजे काय?

ii) कोणत्याही दोन समाजमाध्यमांची नावे सांगा.

iii) कोणत्याही दोन वृत्तपत्रांची नावे सांगा.

iv) अर्जाचे कोणतेही दोन प्रकार सांगा.

v) वृत्तपत्रासाठीच्या लेखाचे कोणतेही दोन प्रकार सांगा.

vi) आकाशवाणी हे कोणत्या स्वरूपाचे माध्यम आहे?

vii) कार्यालयीन भाषा म्हणजे काय?

ब) खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा. **[10]**

i) आपल्या महाविद्यालयातील प्राचार्यांच्या नावे बोनाफाईड प्रमाणपत्र मिळणे बाबत विनंती अर्ज करा.

ii) आपले खाते असलेल्या बँकेत नवीन चेकबुक मिळण्यासाठी विनंती अर्ज करा.

प्र.*2)* खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा. **[15]**

अ) 'शेतकरी मेळावा' या विषयावर वर्तमानपत्रासाठी लेख लिहा.

ब) 'व्यवसाय मार्गदर्शन' या विषयावर आकाशवाणी साठी भाषण लिहा.

क) समाजमाध्यमांमध्ये वापरल्या जाणाऱ्या भाषेचे स्वरूप स्पष्ट करा.

प्र.*3)* खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर लिहा. **[5]**

अ) 'पर्यावरण संवर्धनात युवकांची भूमिका' या विषयावर ब्लॉग लेखन करा.

ब) फेसबुक या माध्यमाचे स्वरूप स्पष्ट करा.

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Total No. of Questions : 3]

SEAT No. :

PD1515

[Total No. of Pages : 1

[6467]-333
S.Y. B.Sc. (Regular)
HINDI (हिंदी)
AECC - IIC : हिंदी काव्य तथा कहानी साहित्य
(2019 Pattern) (Semester-III) (23341)
पाठ्यपुस्तक – साहित्य संगम, सं. प्रो. डॉ. सदानंद भोसले

समय : 2 घंटे] [पूर्णांक : 35

सूचनाएँ : *1)* सभी प्रश्न अनिवार्य है।

2) दाहिनी ओर लिखे अंक प्रश्न के पूर्णांक हैं।

प्र.1) निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर लिखिए। **[15]**

अ) 'अकाल और उसके बाद' कविता का सारांश अपने शब्दों में लिखिए।

ब) दुष्यंत कुमार 'कहाँ तो तय था चिरागाँ हर एक घर के लिए' कविता के माध्यम से क्या कहना चाहते हैं?

क) 'इसको भी अपनाता चल' कविता के द्वारा कवि ने कौन–सा संदेश दिया है?

ड) 'पालतू कुत्ता' कविता में स्त्री–जीवन की वेदना किस प्रकार व्यक्त हुई है?

इ) 'घर' कविता का आशय स्पष्ट कीजिए।

प्र.2) निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर लिखिए : **[15]**

अ) 'उसने कहा था' कहानी के उद्देश्य पर प्रकाश डालिए।

ब) 'भिखारिन' कहानी अमीरी पर गरीबी की विजय को दर्शाती है, स्पष्ट कीजिए।

क) 'ककड़ी की कीमत' कहानी की कथावस्तु अपने शब्दों में लिखिए।

ड) 'कप्तान' कहानी का सारांश लिखिए।

इ) 'बदबू' कहानी में चित्रित समस्या पर प्रकाश डालिए।

प्र.3) निम्नलिखित में से किसी एक प्रश्न का उत्तर लिखिए : **[5]**

अ) 'उसने कहा था' कहानी के लहनासिंह का परिचय दीजिए।

ब) 'इसको भी अपनाता चल' कविता में कवि ने भाईचारे और प्रेम का संदेश दिया है, स्पष्ट कीजिए।

* * *

Total No. of Questions : 4] **SEAT No. :**

PD1516 **[Total No. of Pages : 2**

[6467]-335
S.Y.B.Sc. (Regular)
AECC-II D-LANGUAGE-ARABIC-FUNCTIONAL
Grammar and Translation
(2019 Pattern) (Semester - III) (23371)

Time : 2 Hours] **[Max. Marks : 35**

Instructions to the candidates:

1) ***Attempt all questions.***
2) ***Figures to the right indicate full marks.***

Q1) Define and illustrate the following Grammar. (Any two) **[10]**

1) اَلْمُبْتَدا وَالْخَبَرُ
2) اَلْمَوْصُوْف وَالصَّفَةُ
3) حُرُوْفُ الْهِجَاء

Q2) Translate in English only. (Any five) **[10]**

1) اَلْوَلَدُ ذَكِيٌّ
2) هَذِه الْمَدْرَسَةُ جَيِّدَةٌ
3) اَلتِّلْمِيْذُ ذَاهِبٌ اِلَى الْمَدْرَسَةِ
4) فِى الْفَصْلِ تِلْمِيْذٌ
5) مَكْتَبُه بَعِيْدٌ مِنْ بَيْتِهِ
6) هُوَ ذَاهِبٌ اِلَى بَيْتِ صَدِيْقِه
7) اَلْمُدَرِّسُ الْجَدِيْدُ رَجُلٌ طَوِيْلٌ

P.T.O.

Q3) **Translate in Arabic only (Any five).** **[10]**

1) The teacher is busy.

2) The chair is comfortable.

3) This school is beautiful.

4) There is a table in the room.

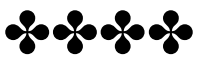
5) On the window there is a curtain.

6) She is busy in her office.

7) That bus is coming from the college.

Q4) **Write the follwoing terms in Arabic (Any ten).** **[5]**

1) Solid
2) Botany
3) Pesticide
4) Nutrition
5) Heat
6) Boiling Point
7) Sphere globe
8) Orbit
9) Astrology
10) Soft
11) Substance
12) Atomic Weight
13) Motion
14) Hygiene
15) Radiation



Total No. of Questions : 5]

SEAT No. :

PD1517

[Total No. of Pages : 2

[6467]-336

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

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

CHNA-231 : Operating System and Diagnostics Tools

(2019 Pattern) (CBCS) (Semester-III) (Paper-III) (23871)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5×1=5]**

a) Write the use of FAT.

b) Define operating system.

c) Write the uses of Auto-CAD.

d) List different types of web browsers.

e) Write the full form of NTFS.

f) What is difference between 'C' and C++ programming language?

Q2) a) i) Explain multi boot operating system. **[2]**

ii) Write the between windows 8 and windows 10. **[4]**

b) What is visual studio and explain the benefits of it? **[4]**

Q3) a) i) What is internet? And write its advantages. **[2]**

ii) Explain Linux operating system in brief. **[4]**

b) What is Dos and its features? **[4]**

P.T.O.

Q4) a) i) What is preventive maintenance in PC. **[2]**

ii) Explain the concept of MODEM in Brief. **[4]**

b) What is OS? Explain the important functions of operating system. **[4]**

Q5) Write short notes on any Four of the following. **[10]**

a) MS Office.

b) Access point.

c) Graphics card.

d) Scanning and Antivirus removal tools.

e) Web browsers.

f) FAT (File Allocation Table).

Total No. of Questions : 5]

SEAT No. : ____

PD1518

[Total No. of Pages : 2

[6467]-337
S.Y.B.Sc. (Regular) (Vocational)
COMPUTER HARDWARE & NETWORK ADMINISTRATION
CHNA -232 : Microprocessor & Interfacing - I
(2019 Pattern) (Semester - III) (Paper - IV) (23872)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compusory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Q.2 to Q.5 carry equal marks.***

Q1) Solve any five of the following. **[5×1=5]**

a) State any two features of 8086 microprocessor.
b) What is cache memory?
c) List any two software interrupts.
d) Write any two control flags in flag register.
e) Define transduces? Give any two example.
f) What is fullform of USB?

Q2) Answer the following questions.

a) i) List any two Non-intel processors. **[2]**

ii) Explain features of core is processor. **[4]**

b) Calculate analog o/p voltage for R-ZR ladder with digital input of 1011 consider logic 0 = 0V and logic 1 = 10 volts. **[4]**

Q3) Answer the following.

a) i) What is ADC? List different types of ADC. **[2]**

ii) Draw schematics diagram to interface matrix keyborad to a microprocessor. **[4]**

b) Describe methods of parallel data transfer with timing diagrams. **[4]**

P.T.O.

Q4) Answer the following.

a) i) Define interrupt. List types of interrupt. **[2]**

ii) Explain light dependent resistor (LDR) with appropriate diagram. **[4]**

b) Describe 2 bit flash ADC. **[4]**

Q5) Write short notes on any four of the following. **[10]**

a) 8086 microprocessor

b) LVDT sensor

c) XEON processor

d) Bus architecture

e) DRAM

f) DMA controller

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Total No. of Questions : 5]

SEAT No. :

PD1519

[Total No. of Pages : 2

[6467]-338

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

BIOTECHNOLOGY

VBT-211 : Cell Biology & Microbial Genetics

(2019 Pattern) (Semester-III) (Paper-III)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Q.2 to Q.5 attempt any three questions.***
3) ***Question 2 to 5 carry equal marks.***

Q1) Answer any five of the following. **[5]**

a) Define conjugation.

b) What are mobile elements?

c) Give any two functions of Nucleus.

d) Name any two cell junction molecules.

e) Define cell signalling.

f) Name organism used in Griffith experiment.

Q2) a) Attempt any two of the following. **[6]**

i) With the help of neat diagram explain generalized transduction.

ii) Diagramatically represent Holliday model.

iii) With the help of neat diagram explain Animal cell.

b) Attempt any one of the following. **[4]**

i) Explain indetail Griffiths experiment for transformation.

ii) Explain in detail fluid mosaic model and give its significance.

P.T.O.

Q3) a) Attempt any two of the following. **[6]**

i) With the help of neat labelled diagram explain the role of Mitochondria.

ii) What are cell junctions? Explain role of selection as cell junction molecule.

iii) Diagramatically represent pathways for adoptosis.

b) Attempt any one of the following. **[4]**

i) Enlist and explain different types of conjugations.

ii) What is Recombination? Explain in detail types of recombination.

Q4) a) Answer any two of the following. **[6]**

i) What are differentialing parameters of plant & animal cell.

ii) Explain in detail mechanism of transformation in *Streptococcus Pneumoniae*.

iii) Explain in detail different types of cell signalling.

b) Attempt any one of the following. **[4]**

i) Explain in detail Gap junctions and Hemidesmosomes as cell junction molecules.

ii) Explain in detail Lederberg & Tatuns experiment.

Q5) Write short notes on (any Four) **[10]**

a) Conjugation

b) Integrins

c) Cell theory

d) ECM

e) Hfr.

Total No. of Questions : 5]

SEAT No. : [ ]

PD1520

[Total No. of Pages : 2

[6467]-339
S.Y.B.Sc. (Vocational)
BIOTECHNOLOGY
VBT-212 : Molecular Biology
(2019 Pattern) (Semester - III) (Paper - IV) (23572)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Questions 2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Define nucleotide.

b) What do you understand by hydrogen bond?

c) What is meant by genome?

d) Define metacentric chromosome.

e) What is glycosylation?

f) Define the term: Denaturation of DNA.

OR

Q2) a) Answer any one of the following. **[6]**

i) Explain the steps involved in initiation of replication in prokaryotes.

ii) Describe the steps involved in prokaryotic genome organization.

iii) Explain the steps involved in elongation of transcription in prokaryotes.

b) Describe the structure of t-RNA in detail. **[4]**

OR

Distinguish between DNA and RNA. **[4]**

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

i) Give the function of amino-acyl tRNA synthetase. Distinguish between class I and class II aminoacyl tRNA synthetase.

ii) Write a short note on base analogues.

iii) Explain the inhibitors of translation in prokaryotes.

b) Write a short note an "5' capping process in eukaryotic mRNA". **[4]**

OR

P.T.O.

Distinguish between transcription and replication of DNA. **[4]**

Q4) a) Answer any two of the following. **[6]**

i) Write a short note on glycosylation.

ii) Give the functions of DNA gyrase, SSB proteins and DNA primase in replication of DNA in prokaryotes.

iii) Define the term: Supercoiling of DNA. Enlist any two differences between positive supercoiling and negative supercoiling.

b) Enlist the proteins involved in mismatch repair mechanism. Add a note on their role in mismatch repair mechanism. **[4]**

OR

Write a short note on base excision repair mechanism. **[4]**

Q5) Write short notes on any 4 of the following: **[10]**

a) Features of replication of DNA.

b) Central dogma of molecular biology.

c) Features of Watson and Crick model of DNA.

d) Role of Pre-RC in eukaryotic initiation of replication.

e) Mutations caused by UV rays.

f) Features of translation.

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Total No. of Questions : 5]

SEAT No. :

PD1521

[Total No. of Pages : 2

[6467]-340

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

SEED TECHNOLOGY

ST 2.1: Hybrid Seed Production

(2019 Pattern) (Semester-III) (2 Credits) (Paper-III) (23891)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any three questions from Q.2 to Q.5.***
3) ***Question 2 to 5 carry equal marks.***

Q1) Solve any five of the following. **[5]**

a) Give any one objective of Hybrid seed production.

b) Define Variety.

c) Define inbreeding depression.

d) Enlist types of Apomixes.

e) What is CMS?

f) Define Emasculation.

Q2) a) Explain Hybrid Seed Production in Bajra with respect to source of seed, selection of field, isolation distance, sowing, cultural practices, rouging, harvesting and threshing. **[6]**

b) Describe pollen storage. **[4]**

Q3) a) Explain C-GMS and its use in Hybrid Seed Production. **[6]**

OR

b) Describe any two basic principles of hybrid seed production. **[4]**

Q4) a) Explain Homomorphic system of Self Incompatibility. **[6]**

b) Describe isolation distance and cultural practices to be carried out during Hybrid Seed Production of Sunflower. **[4]**

P.T.O.

Q5) Write short notes on any FOUR of the following. **[10]**

a) Commercial utilization of inbreeding depression.

b) Genetic Male Sterility

c) Pollen shedders

d) Self incompatibility

e) Stigma receptivity

f) Pollen viability

Total No. of Questions : 5]

SEAT No. :

PD-1522

[Total No. of Pages : 2

[6467]-341
S.Y. B.Sc. (Vocational)
SEED TECHNOLOGY
ST-2.2 : Seed Testing
(2019 Pattern) (Semester - III) (CBCS) (2 Credits) (23892)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Question No.2 to Question No.5.***
3) ***Questions No.2 to Question No.5 carry equal marks.***

Q1) **Solve any five of the following :** **[5]**

a) What is seed testing?

b) Define primary sample.

c) What is offical sample?

d) Define weed seed component.

e) What is ungerminated seed in germination testing?

f) Define germination testing.

Q2) a) Explain procedure of seed sampling. **[6]**

b) Describe mixing and dividing of samples. **[4]**

Q3) a) Explain reporting of results for physical purity analysis. **[6]**

b) Describe paper method of germination testing. **[4]**

P.T.O.

Q4) a) Explain digital moisture meter used for moisture testing. **[6]**

b) Write a note on history of seed testing. **[4]**

Q5) **Write short notes on any four of the following :** **[10]**

a) State Seed Testing Laboratory.

b) Heterogeneity test.

c) Physical purity work board.

d) Equipments in STL.

e) Requirements of germination testing.

f) Abnormal seedling in germination testing.

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Total No. of Questions : 5]

SEAT No. :

PD-1523

[Total No. of Pages : 2

[6467]-342
S.Y. B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
VOC-IND-IMB-211 : Bioreactor - Design and Operation
(2019 Pattern) (Semester - III) (CBCS) (23821) (Paper - III)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Question No.2 to Question No.5.***
3) ***Question No.2 to Question No.5 carry equal marks.***

Q1) **Solve any five of the following :** **[5]**

a) State purpose of Grit removal in wastewater treatment.

b) Why are air compressors used in fermentation industry?

c) What is the function of foam sensor in fermenter?

d) What is CSTR?

e) What is the function of heating & cooling jackets in fermentation facility.

f) What material can be used for construction of laboratory scale fermenter.

Q2) **a) Attempt any three of the following:** **[6]**

i) Explain in brief parts, principle and working of fluidized bed reactor.

ii) Describe the Batch mode of fermentation using a diagram.

iii) What is the purpose of having a wastewater treatment system attached to a fermentation plant?

iv) Draw a well labelled diagram for Air-lift fermenter.

b) Write a short note on utilities in fermentation industry. **[4]**

P.T.O.

Q3) **a) Attempt any three of the following:** **[6]**

i) Explain the process of primary treatment in wastewater treatment.

ii) Write a short note on biological treatment of wastewater.

iii) Enlist different types of fermenters where cells occur in suspended form.

iv) What is secondary treatment in wastewater management?

b) Diagrammatically explain functioning of dissolved oxygen sensor.**[4]**

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

i) Diagrammatically explain fed-batch mode of fermentation.

ii) What is continuous mode of fermentation.

iii) What is the purpose of cooling towers and refrigeration system in fermentation facility?

iv) Draw and depict three types of sensors used in fermentation.

b) How can aseptic conditions be achieved and maintained during fermentation? **[4]**

Q5) **Write short note on any four of the following :** **[10]**

a) Bubble column bioreactor

b) Single use bioreactor

c) Pt 100 electrode

d) Acration and agitation in fermenter.

e) Bioreactor on chips

f) pH electrode

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Total No. of Questions : 5]

SEAT No. :

PD-1524

[Total No. of Pages : 2

[6467]-343
S.Y. B.Sc.
INDUSTRIAL MICROBIOLOGY
VOC-IND-IMB-212 : Screening and Process Optimization
(2019 Pattern) (CBCS) (Semester - III) (23822)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates :

1) ***Q.1 is compulsory.***
2) ***Solve any three questions form Q.2 to Q.5.***
3) ***Question No.2 to 5 carry equal marks.***

Q1) **Solve Any Five of the following :** **[5]**

a) Give names of any two methods used in control of carbon and nitrogen.

b) Define "Un-culturable Bacteria".

c) Name any two methods used for screening of secondary metabolities.

d) Enlist any two important examples of industrially important microrganisms.

e) What is the role of inducers in media formulation.

f) What is the response surface methodology?

Q2) a) **Attempt Any Three of the following :** **[6]**

i) Discuss the need of primary screening of industrially important microorganisms.

ii) What is Simpson's diversity index? Explain its use.

iii) Diagrammatically represent: sequential control.

iv) Describe the significance of Laboratary Scale Fermentation.

b) Explain any one technique of maintenance of industrially important microorganisms. **[4]**

P.T.O.

Q3) a) **Attempt Any Three of the following :** **[6]**

i) Explain with a flow-diagram the process of strain improvement.

ii) Explain significance of media formulation.

iii) Write difference between analogue mutant and revertant.

iv) Explain the correlation of scale up time and temperature regime.

b) Explain in details the concept of unculturable bacteria. **[4]**

Q4) a) **Attempt Any Three of the following :** **[6]**

i) Why strain improvement is needed?

ii) Discuss the process of inoculum build up.

iii) Give importance of aeration as a process parameter.

iv) What is the decimal reduction time? Describe its use.

b) Describe importance of growth factors in industrial fermentation media. **[4]**

Q5) **Write a short notes on any four of the following :** **[10]**

a) Role of microorganisms in ecosystem.

b) Function based targeted screening.

c) Carbon sources used in fermentation media.

d) Response surface methodology (RSM) limitations.

e) Describe media sterilization in batch fermentation.

f) Importance of agitation as a process parameter.

Total No. of Questions : 5] **SEAT No. :**

PD-1525 **[Total No. of Pages : 4**

[6467]-346

S.Y. B.A./S.Y.B.Com./B.Sc-(All courses)

ENVIRONMENTAL SCIENCE AECC - I :

Environmental Awareness

(2019 Pattern) (Semester - III) (23361)

Time : 2 Hours] ***[Max. Marks : 35***

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Question No. 2 to Question No. 5.***
3) ***Question No. 2 to Question No. 5 carry equal marks.***

Q1) **Attempt any Five of the following :**

a) Define desert ecosystem? **[1]**

b) What is drought? **[1]**

c) Define genetic diversity? **[1]**

d) What do you understand by sustainable development? **[1]**

e) What is biological Invasion? **[1]**

f) Define Environment? **[1]**

Q2) **Answer the following :**

a) What is sustainable development & Explain in Brief concept of sustainable development? **[6]**

b) Discuss characteristics of Aquatic Ecosystem. **[4]**

Q3) **Answer the following :**

a) Explain causes and impacts of over exploitation of surface and ground water? **[6]**

b) What are energy resources? Explain causes of growing energy needs? **[4]**

P.T.O.

Q4) **Answer the following :**

a) Define Biological diversity? Explain in Brief levels of Biological diversity? **[6]**

b) What are ecosystem and Biodiversity Services? **[4]**

Q5) **Write a short note on Any Four of the following :** **[10]**

a) Threats to biodiversity **[2½]**

b) Land degradation **[2½]**

c) Biodiversity Hotspots **[2½]**

d) Impact of mining on environment **[2½]**

e) Scope and Importance of Environmental Studies **[2½]**

f) Soil erossion **[2½]**

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Total No. of Questions : 5]

PD-1525

[6467]-346

S.Y. B.A./S.Y.B.Com./B.Sc-(All courses)

ENVIRONMENTAL SCIENCE AECC - I :

Environmental Awareness (2019 Pattern)

(Semester - III) (23361)

(मराठी रूपांतर)

वेळ : 2 तास] *[एकूण गुण : 35*

सूचना : *1) प्रश्न क्र. 1 अनिवार्य आहे.*

2) प्रश्न क्र. 2 ते प्रश्न क्र. 5 मध्ये कोणतेही तीन प्रश्न सोडवा.

3) प्रश्न क्र. 2 ते प्रश्न क्र. 5 समान गुण आहेत.

प्रश्न 1) खालीलपैकी कोणतेही पाच प्रश्न लिहा.

अ) वाळवंट परिसंस्था म्हणजे काय? **[1]**

ब) दुष्काळ म्हणजे काय? **[1]**

क) अनुवंशीक विविधता म्हणजे काय? **[1]**

ड) शाश्वत विकासाचा अर्थ काय आहे? **[1]**

इ) जैविक आक्रमण म्हणजे काय? **[1]**

फ) पर्यावरण म्हणजे काय? **[1]**

प्रश्न 2) खालील प्रश्नांची उत्तरे द्या.

अ) शाश्वत विकास म्हणजे काय? शाश्वत विकासाची संक्षिप्त संकल्पना स्पष्ट करा. **[6]**

ब) जलीय परिसंस्थेची वैशिष्ट्ये लिहा. **[4]**

प्रश्न 3) खालील प्रश्नांची उत्तरे द्या.

अ) पृष्ठभागीय आणि भुजलाच्या अतिवापराचे कारणे आणि परिणाम सांगा. **[6]**

ब) उर्जा स्त्रोत म्हणजे काय? वाढत्या उर्जा गरजांचे कारणे सांगा. **[4]**

प्रश्न 4) खालील प्रश्नांची उत्तरे द्या.

अ) जैवविविधता म्हणजे काय? जैवविविधतेची पातळी संक्षेपात समजावुन सांगा. **[6]**

ब) परिसंस्था आणि जैवविविधता यांच्या सेवा काय आहेत? **[4]**

प्रश्न 5) खालीलपैकी कोणत्याही चारवर टीपा लिहा. **[10]**

अ) जैवविविधतेस धोका **[2½]**

ब) जमिनीचा ऱ्हास **[2½]**

क) जैवविविधता हॉट स्पॉट **[2½]**

ड) खाणकामाचा पर्यावरणावर होणारा परिणाम **[2½]**

इ) पर्यावरणीय अध्ययणाचे महत्व आणि त्याचा विस्तार **[2½]**

फ) मृदा धुप **[2½]**

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Total No. of Questions : 5]

SEAT No. :

PD-1526

[Total No. of Pages : 2

[6467]-347
S.Y. B.Sc.
GEOLOGY
GL 212 : Principles of Stratigraphy & Sedimentation
(2019 Pattern) (Semester - III) (Paper - II) (23162A)

Time : 2 Hours] *[Max. Marks : 35*

Instructions to the candidates:

1) ***Question 1 is compulsory.***
2) ***Solve any Three questions from Question No.2 to Question No5.***
3) ***Draw the diagrams wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) **Answer the following questions in 2-3 lines (Any 5)** **[5]**

a) Define Stratigraphy.

b) What are ripple marks.

c) What is the principle of order of superposition?

d) Enlist any two sedimentary structures.

e) Define weathering.

f) What is rudaceous rock?

Q2) **Answer the following :**

a) Explain biostratigraphy and its units. **[6]**

b) Describe sources of sediments. **[4]**

Q3) **Answer the following :**

a) Explain mechanical & chemical weathering. **[6]**

b) Describe organic sedimentary structures. **[4]**

P.T.O.

Q4) **Answer the following :**

a) Explain primary sedimentary structures. **[6]**

b) Describe chemical & biochemical deposits. **[4]**

Q5) **Write short notes on any FOUR :** **[10]**

a) Chemical structures.

b) Lithostratigraphy.

c) Pene contemporaneous sedimentary structures.

d) Importance of stratigraphy.

e) Residual deposits.

f) Mineral composition of clastic/detrital sediments.

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