[5822]-301

S.Y. B.Sc.

MATHEMATICS

MT - 231 : Calculus of Several Variables

(23111) (2019 Pattern) (Semester - III) (Paper - I) (Credit System)

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 $F(x, y) = 1 + \sqrt{4 - y^2}$. Evaluate F (3, 1).

b) Let $f(x, y) = x^y$. Find $f_x(x, y)$ and $f_y(x, y)$.

c) Define homogeneous function.

d) Find the critical points of the function $f(x, y) = x^2 + y^2$.

e) Evaluate $\int_1^2 x^2 y \, dy$.

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

g) Evaluate $\lim_{(x,y) \to (2,1)} \dfrac{4 - xy}{x^2 + 3y^2}$.

P.T.O.

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

i)   State Clairaut's theorem. Define Laplace's equation, harmonic functions and the wave equation.

ii)   Define function of three variables, domain, range and level surfaces of function of three variables.

b)   Attempt any One of the following :   [5]

i)   Find the limit, if it exists, or show that the limit does not exist :

$$\lim_{(x,y,z)\to(0,0,0)} \frac{xy+yz}{x^2+y^2+z^2}.$$

ii)   Verify that the function $z = \ln(e^x + e^y)$ is a solution of the differential equation

$$\frac{\partial^2 z}{\partial x^2} \frac{\partial^2 z}{\partial y^2} - \left(\frac{\partial^2 z}{\partial x \partial y}\right)^2 = 0.$$

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

i)   If $f(x,y)$ is a homogeneous function of degree n, then show that

$$x\frac{\partial f}{\partial x} + y\frac{\partial f}{\partial y} = nf(x, y).$$

ii)   Suppose that $z = f(x,y)$ is a differentiable function of x and y, where $x = g(s,t)$ and $y = h(s,t)$ are differentiable functions of s and t. Then prove that

$$\frac{\partial z}{\partial t} = \frac{\partial z}{\partial x}\frac{dx}{dt} + \frac{\partial z}{\partial y}\frac{\partial y}{\partial t}.$$

b)   Attempt any One of the following :   [5]

i)   Find the local maximum and minimum values and saddle points of the function

$f(x,y) = \sin x \sin y, -\pi < x < \pi, -\pi < y < \pi.$

ii)   Use Lagrange multipliers to find the maximum and minimum values of the function

$f(x, y) = x^2 + y^2$

Subject to the constraint $xy = 1$.

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

   i) Describe the second derivative test to determine the extreme values of functions of two variables. Describe the method of Lagrange multipliers.

   ii) Write the relationship between rectangular and polar coordinates. Hence derive the formula for double integration in polar coordinates.

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

   i) Evaluate the double integral

   $$\iint_D y^2 dA, D = \{(x, y) \mid -1 \le y \le 1, -y - 2 \le x \le y\}.$$

   ii) Evaluate

   $$\int_0^1 \int_x^{2x} \int_0^y 2xyz \; dz \; dy \; dx$$

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S.Y. B.Sc.

MATHEMATICS (Paper - II)

MT - 232(A) : Numerical Methods and its Applications

(2019 Pattern) (Credit System) (Semester - III) (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.*

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

a) Define Absolute error

b) Find the root x_1 of $x^3 - 18 = 0$ by Newton - Raphson method with $x_0 = 2.5$.

c) Simplify $E^2 x^3$ take $h = 1$

d) Evaluate $\Delta(a^{5x-7})$ take $h = 1$

e) Evaluate $\int_0^1 x^2 dx$ by Trapezoidal rule take $h = 0.5$

f) Write Runge-Kutta second order formula to solve $\dfrac{dy}{dx} = f(x, y)$ with $y(x_0) = y_0$

g) Write the formula for $y_1^{(n+1)}$ in Modified Euler's method

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

i) Explain Newton-Raphson method

ii) Derive Lagrange's interpolation formula

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

i) Evaluate $\int_4^{5.2} \log_e x \, dx$ by Simpson's $\dfrac{3}{8}$ rule take $h = 0.2$

P.T.O.

ii) Find y (0.1) using Runge-Kutta second order method given that

$$\frac{dy}{dx} = x + y \text{ with } y(0) = 1 \text{ and } h = 0.1$$

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

i) Explain Taylor's series method to solve initial value problem.

ii) Explain Euler's method to solve $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$

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

i) Find $\sqrt{10}$ by Newton-Raphson method (Two iterations)

ii) Find log 3.7 using Lagrange's interpolation formula from the following table

x	3	3.5	4
log x	1.0986	1.2527	1.3863

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

i) Write the rules for round-off number to the significant figures.

ii) Derive the formula for $\frac{dy}{dx}$ at $x = x_0$ in terms of forward difference operator Δ.

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

i) Find $\sqrt[3]{18}$ by bisection method lies between 2 and 3. Perform three iterations.

ii) Find y when $x = 1$ by Runge-Kutta fourth order method given

$$\frac{dy}{dx} = \frac{y - x}{y + x}, y(0) = 1$$

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S.Y. B.Sc. (Regular)
MATHEMATICS
MT-232(B): Graph Theory

(2019 Pattern) (Credit System) (Paper - II) (Semester - III) (23112B)

*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 : Simple graph.

   b) Is there exists a 3-regular graph on 5 vertices?

   c) Find the number of components of a null graph with P vertices.

   d) What is the edge connectivity of $K_{2,3}$?

   e) Find the minimum height of a binary tree on 11 vertices.

   f) Find vertex connectivity of following graph.
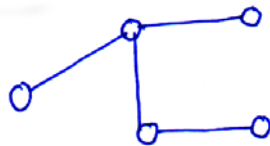
   g) Define : Spanning tree of a graph.

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

   i) If G is a connected graph with *n* vertices and (*n* – 1) edges then prove that G is a tree.

   ii) If G is a simple graph with *n* vertices and *k* components then prove that G can have at most $\dfrac{(n-k)(n-k+1)}{2}$ edges.

P.T.O.

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

    i)   Show that maximum number of edges in a simple graph with n vertices is $\dfrac{n(n-1)}{2}$.

    ii)   Find eccentricity of each vertex in the following graph, also find its center and radius.
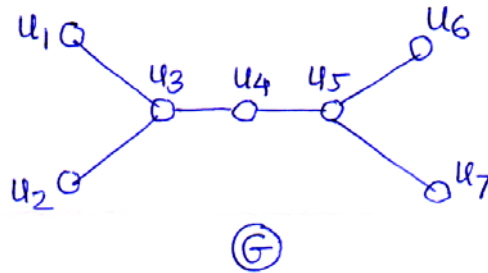
Q3) a) Attempt any One of the following : **[5]**
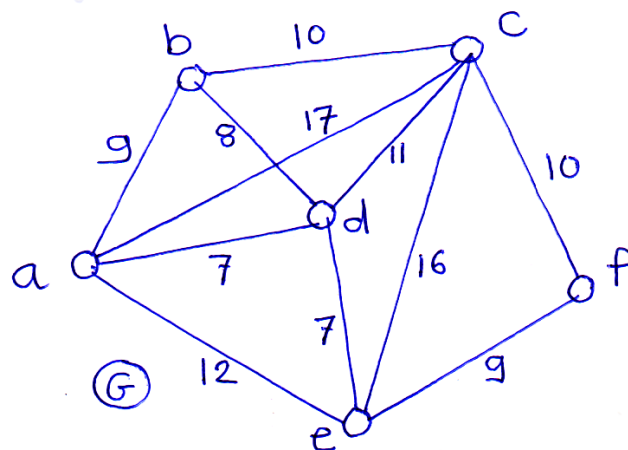
    i)   If T is a binary tree with n vertices then prove that number of pendant vertices in T is $\dfrac{n+1}{2}$.

    ii)   Prove that the edge connectivity of a graph can not exceed the smallest degree of the vertex in G.

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

    i)   Use Kruskal algorithm to find a shortest spanning tree of the graph G shown below :

ii) Find the fundamental circuits of the following graph G with respect to the given spanning tree T shown below.
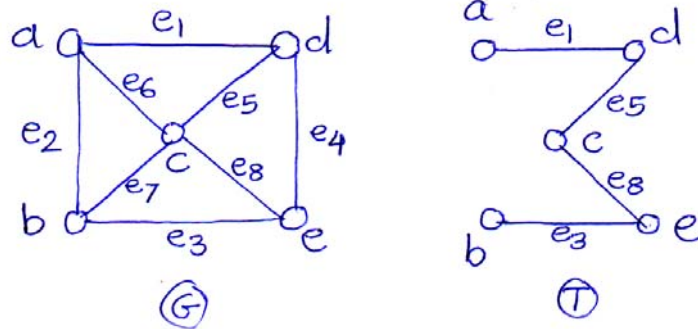
Q4) a) Attempt any One of the following : [5]

i) If a graph has exactly two vertices of odd degree then prove that there must be a path joining these two vertices.

ii) Prove that there is one and only one path between any two vertices in a tree.

b) Attempt any One of the following : [5]

i) Draw the graph $K_{3,4}$. Find its vertex and edge connectivity.

ii) Determine whether K_6 and $K_{3,3}$ are isomorphic or not. Justify.

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S.Y. B.Sc.
PHYSICS - I
PHY - 231 : Mathematical Methods in Physics - I
(CBCS) (2019 Pattern) (Paper - I) (Semester - III) (23121)

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

Instructions to the candidates:
1) *Q. 1 is compulsory.*
2) *Que. 2 to Que. 5 carry equal marks.*
3) *Solve any three questions from Que. 2 to Que. 5.*
4) *Figure to the right indicate full marks.*
5) *Use of calculator & log table is allowed.*

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

     a)   State Laplacian operator.

     b)   What is ordinary differential equation.

     c)   State De-Moivre's theorem.

     d)   Define rotational vector field.

     e)   What is the area of parallelogram whose one diagonal is $2\hat{i} + \hat{j} - 2\hat{k}$ and one side is $3\hat{i} + \hat{j} - \hat{k}$.

     f)   If F = $x^2 + xy + y^2$ then find $\dfrac{\partial F}{\partial x}, \dfrac{\partial F}{\partial y}$

Q2) Answer the following :

     a)   i)   What is an Argand diagram and explain the addition of two complex numbers by using Argand diagram   **[3]**

          ii)   What do you mean by a solenoidal vector field? Give one example.   **[3]**

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

What do you mean by curl of a vector & show that the curl of the linear velocity of any particle of rotating body is twice of the its angular velocity. **[6]**

b) Express $\dfrac{1+2i}{1-3i}$ in the form $\gamma(\cos\theta + i\sin\theta)$. **[4]**

Q3) Answer the following questions :

a) i) Discuss the condition for maxima & minima for one variables & many variables. **[3]**

   ii) Show that the point x = 0 is a regular singular point of the differential equation. **[3]**

$$2x^2\frac{d^2y}{dx^2} + 3x\frac{dy}{dx} + (x^2 - 4)y = 0$$

OR

What do you mean by vector field & show that **[6]**

$$\nabla^2\left(\tfrac{1}{r}\right) = 0$$

b) Find the approximate value of $\sqrt{(2.99)^2 + (3.99)^2}$ using method of differentials. **[4]**

Q4) Answer the following questions :

a) i) Distinguish between implicit & Explicit function. **[3]**

   ii) The logarithm of a complex number is a multivalued function. Explain. **[3]**

OR

Legendre equation has the form $(1 - x^2)y'' - 2xy' + l(l+1)y = 0$ where l is constant. Show that $x = 0$ is ordinary point & $x = \pm 1$ are regular singular point of this equation. **[6]**

b) A balloon is in the form of right circular cylinder of radius 1.5m and length 4m is surmounted by hemispherical ends. If the radius is increased by 0.01m and length by 0.05m, find the percentage change in the volume of the balloon. **[4]**
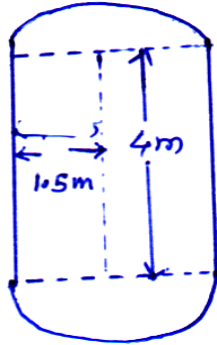
Q5) Attempt any four of the following : **[10]**

a) Obtain the quadratic equation whose roots are $(1 + i)$ & $(1 - i)$.

b) Show that $|\bar{A} \times \bar{B}|^2 + |\bar{A} \cdot \bar{B}|^2 = |A|^2 |B|^2$.

c) The temperature at any point in the space is given by $T = xy + yz + zx$, determine the derivative of T in the direction of vector $3\hat{i} - 4\hat{k}$ at the point (1, 1, 1).

d) Show that $\bar{\nabla} \cdot \bar{\nabla} \phi = \nabla^2 \phi$

e) Decide the degree & order of the differential equations

$$\frac{d^3 y}{dx^3} + \sqrt[3]{\left(\frac{dy}{dx}\right)^2} + y^2 = 0$$

f) Interpret the following equation geometrically $|Z + 3| = 2|Z - 3|$ where $Z = x + iy$.

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

PHYSICS

PHY - 232A : Electronics

(CBCS) (2019 Pattern) (Paper-IIA) (23122A)

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 Q5 carry equal marks.*
4) *Use of calculator and log table is allowed.*
5) *Figures to the right indicates full marks.*

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

a) Define CMRR.

b) State thevenin's theorem.

c) Find the value of β if $\alpha = 0.99$

d) Give any two characteristics of ideal op-amp.

e) Convert $(15)_{10}$ in to equivalent binary number.

f) Convert $(4BAC)_{16}$ to binary.

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

a) Describe use of UJT on relaxation oscillator. Derive the formula of frequency.

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

Describe fixed bias or base resistor method. Give it's advantages.

b) What is logic gate? Explain NAND, NOR, & EX-OR gate with symbol & truth table.   **[4]**

Q3) Answer the following.

    a)   Explain with circuit diagram op-amp as substractor.   **[6]**

<center>OR</center>

        Explain input & output characteristics of common-emitter configuration of a transistor.

    b)   Nortonize the following circuit.   **[4]**
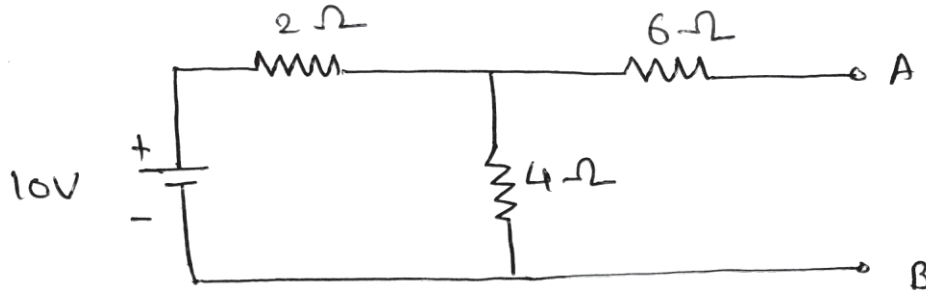
Q4) Answer the following :

    a)   Discuss the gain of an amplifier with positive & Negative feedback. **[6]**

<center>OR</center>

        What is oscillator? Discuss the phase shift oscillator with circuit diagram.

    b)   Simplify the following equation & then draw logic diagram.   **[4]**

        $Y = A\bar{B}C + A\bar{B}\bar{C} + B$

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

    a)   Types of feedback circuits (any two)

    b)   Construction of BJT.

    c)   Concept of virtual ground.

    d)   Exclusive OR gate.

    e)   Transistor as an Amplifier.

    f)   Boolean Algebra.

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S.Y. B.Sc. (Semester - III)
PHYSICS
PHY - 232B : Instrumentation
(CBCS) (2019 Pattern) (Paper-II) (B) (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 Q5 carry equal marks.*
4) *Use of calculator and log table is allowed.*
5) *Figures to the right indicates full marks.*

Q1) Solve any <u>five</u> 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) Calculate the core displacement if output voltage developed across terminal of LVDT is 1.5V. The sensitivity of LVDT is 2MV/mm.

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

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

Q2) Answer the following :

a) Draw circuit diagram and explain.   **[6]**

     i)   Current to voltage converter

     ii)   Voltage to current converter using OPAMP.

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

     Draw circuit diagram and explain LVDT.   **[6]**

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

Q3) Answer the following :

a) Write applications of piezoelectric transducer. **[6]**

OR

Explain seismic motion transducer. **[6]**

b) Calculate the gain of non-inverting amplifier when input resistance at inverting terminal is 10kΩ and Feedback resistance is 200kΩ. If the feedback resistance is doubled, what is the change in voltage gain? **[4]**

Q4) Answer the following.

a) What is thermoelectric effect? Explain how thermocouple is used as a thermometer. **[6]**

OR

What is thermistor? What is NTC and PTC. **[6]**

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 notes on any Four of the following. **[10]**
a) Hysteresis
b) Classification of transducer based on physical quantity.
c) Inductive transducer used for the measurement of displacement.
d) Seebeck effect
e) Corrugated Diaphragms
f) Buffer Amplifier

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S.Y. B.Sc. (Regulation)

CHEMISTRY

CH - 301 : Physical and 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)   What is mean by absorption?

  b)   Define the term error.

  c)   What is mean by two color indicator?

  d)   What is rate law?

  e)   Define the term end point.

  f)   Define the term temperature coefficient.

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

  i)   Explain the methods of expressing precision.

  ii)   Write note on $KMnO_4$ as an oxidising agent.

  iii) Define the rate of reaction. Discuss the factor affecting the rate.

  b)   Derive the exponential form of Arrhenius equation.   **[4]**

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

  i)   Explain Freundlich Adsorption Isotherm.

  ii)   Explain the standardisation of $AgNO_3$ with potassium chromate indicator.

  iii) Explain the determination of order of reaction by differential method.

  b)   The time for 50% completion of first order reaction is 35min. Calculate the time required for 75% completion of reaction.   **[4]**

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

      i) Explain the characteristics of zero order reaction.

      ii) What are redox indicators? Explain the role of 1, 10 - phenanthroline as redox indicator.

      iii) Write note on purification of water by ion-exchange method.

    b) Calculate pH of 0.05N acetic acid solution. (Given : $K_a = 1.75 \times 10^{-5}$).**[4]**

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

    a) What is the difference between physisorption and chemisorption?

    b) Give the brief account of classification of errors.

    c) What do you mean by terms titrant, titrand and titration?

    d) What are primary and secondary standard substances?

    e) Explain neutralization curve for strong acid-weak base titration.

    f) What are the sources of indeterminate errors?

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S.Y. B.Sc.

CHEMISTRY

23132 : Inorganic And Organic Chemistry (CH-302)

(CBCS) (2019 Pattern) (Semester - III) (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 write indicate full marks.*

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

a) Define the term non-bonding orbital.

b) What is bond order in HF molecule?

c) Define co-ordination number.

d) Benzene is aromatic compound. Explain

e) State saytzeff's rule.

f) Alcohol have higher boiling point than alkene, explain.

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

i) Distinguish between Atomic orbital and molecular orbitals.

ii) Explain the formation N_2 molecule on the basis of MOT.

iii) What is electrophilic substitution reaction? Explain sulphonation benzene.

b) Answer the following. **[4]**

i) What are arylhalide? How will you prepare chlorobenzene from a) phenol b) benzene.

ii) Distinguish between double salt and co-ordination compound.

P.T.O.

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

     i) Name the following compounds according to IUPAC system.

        a) $Na_3[Ag(S_2O_3)_2]$ b) $K_3[Al(CrO_4)_3]\cdot3H_2O$

        c) $K_3[Al(C_2O_4)_3].3H_2O$

     ii) Explain formation of O_2 molecule according to MO theory.

     iii) How is ethyl alcohol prepared from a) Acetaldehyde b) Ethyl chloride.

  b) Answer the following **[4]**

     i) Write M.O. electronic configuration of B_2 molecule and Give its bond order.

     ii) Identify product A and B and rewrite reaction.
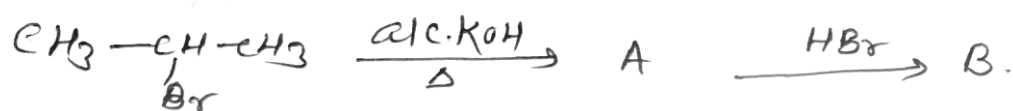
Q4) a) Answer any two of the following. **[6]**

     i) Give comparison and features of V.B. theory and M.O. theory.

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

     iii) Write note on Reimer-Tiemann reaction.

  b) Answer the following. **[4]**

     i) Calculate stabilisation energy and bond order of He_2.

     ii) Identify the reaction products A and B.
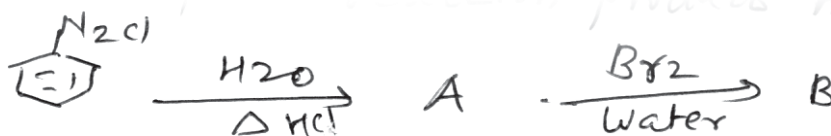
Q5) Answer any four of the following. [10]

a) What is the need of molecular orbital theory.

b) Define coordination number. What is the coordination number of Mg in $[Mg (EDTA)]^{2+}$

c) Identify product A and B and rewrite reaction.

$$\text{[benzene]} + CH_2=CH-CH_3 \xrightarrow[H_3PO_4]{\Delta, 250^\circ} A \xrightarrow[\Delta, 95-125^\circ]{air\ oxidation} B$$
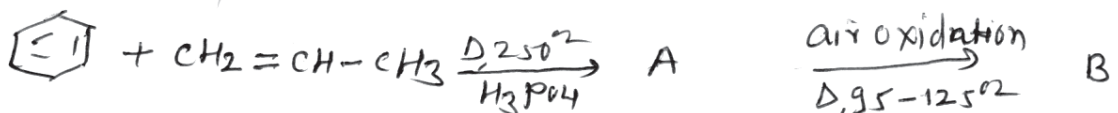
d) Write note on Williamson's synthesis.

e) How will you prepare benzene from i) Acetylene and ii) phenol

f) What is nucleophilic substitution reaction? Give the types of nucleophilic substitution reaction.

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S.Y. B.Sc.

BOTANY (Regular)

BO - 231 : Taxonomy of Angiosperms and Plant Ecology

(CBCS) (2019 Pattern) (Paper - I) (Semester - III) (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 2 to Q.5 carry euqal marks.

　　4)　Figures to right indicate full marks.

　　5)　Draw neat labelled diagrams wherever necessary.

Q1) Attempt <u>any five</u> of the following :　　　　　　　　　　　　　　**[5]**

　　a)　Write an example of Natural system of classification.

　　b)　What is type of fruit in family Solanaceae?

　　c)　Define systematics.

　　d)　What is generic name?

　　e)　Define ecology.

　　f)　What are xerophytes?

Q2) a)　Write salient features, floral formula, floral diagram and economic importance of Family Rubiaceae.　　　　　　　　　**[6]**

　　b)　Write a brief note on APG system of classification.　　**[4]**

Q3) a)　Write the principles of ICN.　　　　　　　　　　　　**[6]**

　　b)　Write economic importance of family Brassicaceae.　　**[4]**

Q4) a)   Describe hotspots of India.   **[6]**

b)   Write adaptive internal features of hydrophytes with an example.   **[4]**

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

a)   Importance of taxonomy

b)   Limitations of Artificial system of classification

c)   Androecium and gynoecium of Annonaceae

d)   Holotype

e)   Concept of Beta diversity

f)   Adaptive internal features of mesophytes

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S.Y. B.Sc. (Semester - III)
BOTANY
BO-232 : Plant Physiology
(2019 Pattern) (CBCS) (Paper - II) (23142)

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

Instructions to the candidates:
  1) *Question 1 is compulsory*
  2) *Attempt any three questions from Q. 2 to Q. 5.*
  3) *Question 2 to 5 carry equal marks.*
  4) *Figures to right indicate full marks.*
  5) *Draw neat labelled diagrams wherever necessary.*

Q1) Attempt <u>any five</u> of the following : **[5]**

  a) Define ascent of sap.

  b) What is seed dormancy?

  c) Enlist types of transpiration.

  d) Define plant physiology.

  e) What is symbiotic nitrogen fixation?

  f) Write any two factors affecting rate of water absorption.

Q2) a) Explain non-symbiotic N_2 fixation with the help of suitable example. **[6]**

  b) Describe cohesion-Tension theory for ascent of sap. **[4]**

Q3) a) Define transpiration. Describe various factors affecting rate of transpiration. **[6]**

  b) Explain metabolic changes occur during seed germination. **[4]**

P.T.O.

Q4) a) What is vernalization? Explain applications of vernalization in detail.

[6]

b) Describe the mechanism of water absorption in brief. **[4]**

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

a) Scope of plant physiology.

b) Antitranspirants.

c) SDP

d) Nitrogenase enzyme.

e) Significance of transpiration.

f) Vigour Index.

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SEAT No. :

[Total No. of Pages : 2

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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)   *Q. 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 example of class Amphibia.

  b)   Give example of Agnatha.

  c)   What is clasper?

  d)   Give example of Hemichordata.

  e)   What is mesovarium?

  f)   What is shagreen?

Q2) a)   Describe internal structure of Heart of Scoliodon.   **[6]**

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

       Write the general characters of class Pisces.

  b)   Give the general characters of cephalochordata.   **[4]**

Q3) a)   Describe different types of scales in fishes.   **[6]**

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

       Sketch and label female reproductive system of scoliodon.

  b)   Give external characters of Scoliodon.   **[4]**

Q4) a) Give functions of Brain of scoliodon. [6]

OR

Give the salient features of phylum chordata.

b) Describe the Digestive glands of scoliodon. [4]

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

a) Yolk sac placenta

b) Homocercal fin

c) Economic importance of scoliodon

d) Paired fins of scoliodon

e) Parental care in Apoda

f) Liver of Scoliodon

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

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

Instructions to the candidates:
   1)   *Q.1 is compulsory.*
   2)   *Solve any Three questions from Q2 to Q5.*
   3)   *Questions 2 to 5 carry equal marks.*

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

   a)   What is sericulture?

   b)   Mention any two agricultural pests.

   c)   Give any two diseases of silkworm.

   d)   What is mechanical pest control?

   e)   What is univoltine?

   f)   Mention any two damages caused by Jowar stem borer.

Q2) a)   Explain bed cleaning methods of silkworm.   **[6]**
                                         OR
       Explain life cycle of Jowar stem borer.

   b)   Explain Rat and Crab as a non-insect pests.   **[4]**

Q3) a) Explain chemical control measures of pests. **[6]**

OR

Explain life cycle of <u>Bombyx mori</u>.

b) Explain Uzi-fly. **[4]**

Q4) a) Explain post-harvest processing of cocoons. **[6]**

OR

Explain concept of IPM.

b) Describe Knapsack sprayer. **[4]**

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

a) Branch cutting method.

b) Biological pest control.

c) Biomedical applications of silk.

d) Damage caused by mango stem borer.

e) Tassar silk moth.

f) Control measures of Tick.

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S.Y. B.Sc. (Regular)
GEOLOGY
GL-211: Structural Geology
(2019 Pattern) (Credit System) (Semester - III) (23161)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

1) *Q.1 is compulsory.*
2) *Solve any three questions from Q2 to Q5.*
3) *Q2 to Q5 carry equal marks.*

Q1) Answer the following in 2-3 lines (any five) :   **[5]**

a) Types of Dip.

b) Define Boudinage.

c) What is heave?

d) Strike and dip symbol for horizontal and vertical strata.

e) Draw anticline symmetrical fold.

f) Define structural Geology.

Q2) a) Define plastic deformation. Explain Reckie's principle.   **[6]**

b) Write definition & concept of stress and strain.   **[4]**

Q3) a) What is fold? Explain types of fold.   **[6]**

b) Define joints. Give genetic classification of joints.   **[4]**

Q4) a) Define fault. Give the terminologies associated with fault plane. **[6]**

b) Explain Brittle and Ductile deformation. **[4]**

Q5) Write a note on (any four) : **[10]**

    a) Brunton compass.

    b) Rake and Plunge.

    c) Genetic types of fractures.

    d) Effect of fault on disrupted strata.

    e) Types of shear zone.

    f) Rotational movement along fault.

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[5822]-313

S.Y. B.Sc. (Regular)
GEOLOGY
GL-212: Palaeontology
(2021 Pattern) (Credit System) (Semester - III) (23162B)

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

Instructions to the candidates:

1)   *Question No. 1 is compulsory.*

2)   *Solve any Three questions from Question 2 to Question 5.*

3)   *Questions No.2 to 5 carry equal marks.*

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

    a)   Enlist branches of micro palaeontology.

    b)   What is Index fossil?

    c)   What is mutation?

    d)   What are diatoms?

    e)   What is Palynology?

    f)   What is Mega fossil?

Q2) Answer the following :

    a)   Give classification of Phylum Arthropoda. Give morphological characters and draw neat diagram.   **[6]**

    b)   Give morphology of spores.   **[4]**

Q3) Answer the following :

  a) Give classification, morphological characters and geographical distribution of ptilophylum. **[6]**

  b) What is micro palaeontology? State its uses. **[4]**

Q4) Answer the following :

  a) Explain field techniques for collection of megafossils. **[6]**

  b) Explain evidences of Macroevolution. **[4]**

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

  a) Stromatolites.

  b) Foraminifers.

  c) Petrification.

  d) Dicroidium.

  e) Micro-evolution.

  f) Morphological characters of vertebrate fossils.

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[5822]-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) Attempt each of the following :

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

　　i) If $X \to NB (k,p)$ then for $k = 1$, x follows.

　　　a) Geometric Distribution 　b) Binomial Distribution

　　　c) Poisson Distribution 　　d) None of the above

　　ii) Suppose $\underline{x} = (x_1, x_2, x_3) \to MD \left(5, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}\right)$ then var (x_2) is _____.

　　　a) 9/10 　　　　　　b) 10/9

　　　c) 5/3 　　　　　　d) 10/3

　　iii) If $y = 600$, $T = 430$, $s = 90$, $I = 40$ then under additive model
　　　$c =$ _____.
　　　a) 50 　　　　　　b) 30
　　　c) 40 　　　　　　d) 1160

　b) State whether <u>each</u> of the following statement is true or false : **[1 each]**

　　i) The mean of B (n,p) truncated below at $x = 0$ is $\dfrac{np}{q^n}$

　　ii) Seasonal variations have period less than one year.

P.T.O.

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

   a) Derive the expression for mean and variance of NB (K, P).

   b) If $(x_1, x_2, x_3) \to$ MD (n, p_1, p_2, p_3) show that the multiple correlation coefficient $R_{1.23} = 1$.

   c) Suppose X_T is poisson r.v with $\lambda = 5$ truncated below at $x = 0$ find

   i) $P(X_T \le 1)$ ii) $P(X_T = 2.5)$

   iii) $E(X_T)$ iv) $P(X_T \ge 2)$

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

   a) Distinguish between seasonal variations and cyclical variations.

   b) State and Prove additive property of negative binomial distribution.

   c) Estimate trend for 2021 by fitting straight line equation for the following time series.

Year	2015	2016	2017	2018	2019
Sales in 10,000 Rs.	35	56	79	80	82

Q4) Attempt any One of the following :

   a) i)   If $\underline{X} = (x_1, x_2, x_3) \to$ MD $(8, \dfrac{1}{2}, \dfrac{1}{4}, \dfrac{1}{4})$, find : correlation and dispersion matrix of x and also obtain their ranks.   **[7]**

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

   b) i)   Discuss any two components of time series in detail.   **[4]**

       ii) If $(x_1, x_2, x_3, \underline{\hspace{1cm}} x_k) \to$ MD $(n, p_1, p_2, p_3, \underline{\hspace{1cm}} p_k)$ find the marginal distribution of x_i hence $E(x_i)$.   **[6]**

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S.Y. B.Sc.

STATISTICS (Semester - III)

ST-232: Continuous Probability Distributions

(2019 Pattern) (Paper - II) (23172) (Credit System)

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 tables is allowed.*

4) *Symbols and abbreviations have their usual meanings.*

Q1) Attempt each of the following :

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

i) If a r.v.x has p.d.f.

$f(x) = c$; $-2 \leq x \leq 2$

$= 0$; otherwise

then the value of c is

A) $+2$ B) $1/2$

C) 4 D) $1/4$

ii) Let X is a symmetric r.v. with $E(X) = m$. Then $E(X-m)^3$ is

A) m B) m^3

C) 0 D) 1

iii) If $X \rightarrow N(\mu, \sigma^2)$ with $\mu_4 = 12$ then the value of σ is

A) 4 B) 2

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

b) State whether the given statement is true or false in each of the following:

[1 each]

    i) $E(c) = 0$ where c is any constant.

    ii)   Normal distribution is mesokurtic

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

    a)   Let X is continuous r.v. with p.d.f.

        $f(x) = 4(1-x)^3 \; ; \; 0 < x < 1$

            $= 0$; otherwise

        Find :

        i)   E (x) and

        ii)   distribution of $Y = \dfrac{X}{1-X}$.

    b)   Obtain point of inflexion of normal probability curve.

    c)   If X_1, X_2 are *i.i.d.* $Exp(1)$ then show that $Y = \min(X_1, X_2) \rightarrow Exp(2)$.

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

    a)   If X is a *r.v.* taking values $(-a, a)$ has p.d.f. $f(x)$ then find the p.d.f. of $Y = |X|$.

    b)   Obtain mode of $N(\mu, \sigma^2)$.

    c)   The joint p.d.f. of a two dimensional continuous *r.v.* (X,Y) is

        $f(x, y) = \dfrac{8}{9} xy \quad ; 1 \le x \le y \le 2$

            $= 0$; otherwise

        Find :

        i)   Marginal distribution of X.

        ii)   Conditional distribution of Y given $X = x$.

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

a) i) The joint p.d.f. of a two dimensional continuous *r.v.* (X, Y) is

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

$= 0 \; ; \;$ otherwise

Find E(Y|X = x) **[7]**

ii) If $X \rightarrow U[a, b]$ then find median of X. **[3]**

b) i) The p.d.f. of a continuous *r.v.* X is

$f(x) = \dfrac{1}{2} \; ; -1 \le x \le 1$

$= 0 \quad ;$ otherwise

Find *m.g.f.* of X. Also find E(x). **[5]**

ii) State and prove lack of memory property of exponential distribution. **[5]**

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S.Y. B.Sc.
GEOGRAPHY (Paper - I)
GG - 231 : ENVIRONMENTAL GEOGRAPHY - I
(2019 Pattern) (CBCS) (Semester - III) (23181)

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

Instructions to the candidates:

1) *Q.1 is compulsory.*

2) *Attempt any Three questions form 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) What do you mean by an ecosystem?

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

c) What is Environmental Determinism.

d) Give any two natural causes of climate change.

e) Name the mountain ranges belongs to Narmada Project.

f) Who was the main leader of the 'Chipko Movement'?

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

i) Describe the structure of an ecosystem.

ii) Describe the human life in mountainous region.

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) Write different problems of the desert region.

P.T.O.

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

    i) Explain the 'Chipko Movement'.

    ii) Explain different causes of water pollution.

    iii) Explain the nature of Environmental Geography.

  b) Answer the following questions in 150 words (Any One) : **[4]**

    i) Give an account of human activities in the coastal region.

    ii) Explain different causes of global biodiversity depletion.

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

    i) Describe the significance of Environmental Geography.

    ii) Describe Environmental determinism.

    iii) Write the significance of Narmada Bachao Andolan.

  b) Answer the following questions in 150 words (Any One) : **[4]**

    i) Explain different effects of biodiversity loss in India.

    ii) Explain different human causes of climate change.

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

  a) Equatorial Ecosystem.

  b) Global Biodiversity.

  c) Causes of Nuclear Pollution.

  d) Energy crisis in India.

  e) History of Narmada Bachao Andolan.

  f) Food Web.

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S.Y. B.Sc.
GEOGRAPHY

Gg - 232 : Geography of Maharashtra (Physical-I)
(CBCS 2019 Pattern) (Semester - III) (Paper-II) (23182)

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) When Deccan Trap is formed?

    b) Name any two states bordered by Maharashtra.

    c) Write any two highest peaks in the Western Maharashtra.

    d) Name any two tributaries of the Godavari river.

    e) What is mean by break in Monsoon?

    f) Define the term 'Soil loss'.

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

    a) Describe the 'Sahyadri'

    b) Describe the Bhima river.

    c) Describe the attributes of Agroforestry.

    B) Answer the following questions in 150 words. (Any one)   **[4]**

    a) Location and Extent of Maharashtra.

    b) Write the physiography of kokan coast.

                                                P.T.O.

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

   a)   Explain the Deccan Basalt Province.

   b)   Explain the Maharashtra plateau.

   c)   Explain any two methods of soil conservation.

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

   a)   Write reasons about the climatic heterogeneity in Maharashtra.

   b)   Write any four causes of deforestation.

Q4) A) Answer the following questions in 100 words. (Any Two) **[6]**

   a)   Write the administrative divisions of Maharashtra.

   b)   Discuss about the evolution of sahyadri.

   c)   Explain the rainfall distribution in Maharashtra.

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

   a)   Give a brief overview of the Krishna river in Maharashtra.

   b)   Write any four causes of Soil erosion in Maharashtra.

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

   a)   The Maratha empire in Maharashtra.

   b)   Characteristics of sahyadri.

   c)   East flowing rivers.

   d)   Importance of monsoon in Maharashtra.

   e)   Effects of Soil erosion.

   f)   Agroforestry in Maharashtra.

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S.Y. B.Sc. (Regular)
MICROBIOLOGY
MB - 231 : Medical Microbiology and Immunology
(2019 Pattern) (CBCS) (Semester - III) (Paper - I) (23191)

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)   Oral Thrush is caused by _____.

    b)   Define Active immunity.

    c)   Name the toxins produced by <u>Staphylococcus aureus</u>.

    d)   Give two examples of passive immunization.

    e)   Define term 'Endemic'.

    f)   When Anti-A antibodies are present in the serum of person's blood, the blood group is _____

        i)   A   ii)   B

        iii)   AB   iv)   O

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

        i)   ABO blood group system.

        ii)   MIC

        iii)   Rh blood group.

        iv)   Antagonism in drug administration.

   b) Draw neat, labelled diagram of Large and Small Lymphocyte. **[4]**

Q3) a) Explain the following (Any Three) : **[6]**

        i)   Difference between active and passive immunization.

        ii)   Laboratory diagnosis of <u>Staphylococcus</u> <u>aureus</u>.

        iii)   Aquired immunity.

        iv)   Epidemiology of dermatophytes infections.

   b) Write on morphological, cultural and Biochemical characteristics of <u>E</u>. <u>coli</u>. **[4]**

Q4) a) Describe the following (Any Three) : **[6]**

        i)   Immunization schedule in India.

        ii)   MRSA

        iii)   Cells of Myeloid Lineage.

        iv)   Toxic shock syndrome.

   b) Explain with neat, lebelled diagram of following : **[4]**

   Mother's blood group is 'B' and Father's blood group is 'A'. What would be possible blood groups of children.

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

    a)   Antigen.

    b)   Virulence.

    c)   Components of innate immunity.

    d)   Enterotoxigenic E. Coli.

    e)   Macrophages.

    f)   Symptoms and Chemotheraphy of candidiasis.

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S.Y. B.Sc.

MICROBIOLOGY

MB-232: Bacterial Physiology and Fermentation Technology

(2019 Pattern) (CBCS) (Semester - III) (23192) (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.*

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

a)   Define apoenzyme.

b)   Name any two carbon sources typically used in industrial fermentations.

c)   CSTK stands for _____.

d)   Enlist any two properties of an enzyme.

e)   What is a ribozyme?

f)   What is the difference between primary and secondary metabolites?

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

i)   Describe the effect of substrate concentration on enzyme activity.

ii)   Write a note on structure of active site of enzyme.

iii)   How is foam monitored and controlled during fermentation?

iv)   Define and explain the role of prosthetic group.

b)   Describe the desirable characteristics of an industrial strain.   **[4]**

Q3) a) Explain the following Any three : **[6]**
   i) Write a note on induced fit model of catalysis.
   ii) Explain the different parts of a typical CSTR.
   iii) Explain the process of crowded plate technique of screening.
   iv) Explain the difference between catabolism and anabolism.

   b) Describe in detail the process of cheese production. **[4]**

Q4) a) Describe the following Any three : **[6]**
   i) Describe the significance of TCA cycle.
   ii) Describe the importance of preservation of industrially important strains.
   iii) Describe the consequences of contamination in fermentation process.
   iv) Describe how pH is monitored and controlled during fermentation.

   b) Describe in detail the process of glycolysis. **[4]**

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

   a) Oxidoreductases.

   b) Role of impellors in fermentor.

   c) Biofertilizers.

   d) Transition model.

   e) Batch fermentation.

   f) Inducers in fermentation media.

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[5822]-320
S.Y. B.Sc.
NANOSCIENCE AND NANOTECHNOLOGY
N.S. - 231: Physical Techniques for Synthesis of Nanomaterials
(2019 Pattern) (Paper - I) (Semester - III) (23261)

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

Instructions to the candidates:
1) *Question 1 is compulsory.*
2) *Solve any three questions from Q2 to Q5.*
3) *Question 2 to 5 carry equal marks.*
4) *Draw neat & labeled diagram wherever necessary.*
5) *Figures to the right indicate full marks.*

Q1) Attempt any <u>Five</u> of the following :   **[5]**

a) Define ultrasonic exfoliation.

b) Draw the neat labelled diagram of Ball milling.

c) What is sputter deposition?

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

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

f) Give any two applications of nanoparticles.

Q2) A) Attempt any <u>One</u> of the following :   **[6]**

a) Explain ion-beam technique.

b) Explain laser assisted exfoliation.

B) Explain Biological synthesis of nanoparticles by using plants.   **[4]**

Q3) A) Attempt any <u>One</u> of the following :   **[6]**

      a)   Explain electric arc deposition.

      b)   Explain Ball milling technique.

   B) Explain influence of Reactant concentration biological synthesis of metal nanoparticles.   **[4]**

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

      a)   Explain mechanical exfoliation using Scotch tape.

      b)   Explain vacuum evaporation.

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

Q5) Write short notes on any <u>Four</u> of the following :   **[10]**

   a) Sputter deposition.

   b) Ultrasonic exfoliation.

   c) Molecular beam epitaxy.

   d) Vacuum evaporation.

   e) Electric arc-deposition.

   f) Ball-milling technique.

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[5822]-321

S.Y. B.Sc. (Regular)
NANOSCIENCE AND NANOTECHNOLOGY
NS-232: Properties of Nanomaterials
(Physical, Chemical, Optical & Magnetic)
(2019 Pattern) (Credit System) (Paper - II) (Semester - III) (23262)

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

Instructions to the candidates:

1) *Question 1 is compulsory.*
2) *Solve any three questions from Q2 to Q5.*
3) *Question 2 to 5 carry equal marks.*
4) *Draw neat & labeled diagram wherever necessary.*
5) *Figures to the right indicate full marks.*

Q1) Attempt any <u>Five</u> of the following : **[5]**

a) What is surface area?

b) What is mean by hydrophilicity?

c) What is mean by blocking temperature?

d) What is elasticity?

e) Define luminescence.

f) What is exciton?

Q2) A) Attempt any <u>One</u> of the following : **[6]**

a) With neat labeled diagram explain TEM.

b) Explain the Neel relaxation in absence of magnetic field.

B) What is ferromagnetism? Explain in brief. **[4]**

Q3) A) Attempt any <u>One</u> of the following : **[6]**

    a)   With block diagram explain photoluminescence spectroscopy.

    b)   Explain the Atomic Force Microscopy technique with block diagram.

  B) Explain types of hardness test. **[4]**

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

    a)   Explain giant magneto resistance.

    b)   What are the paramagnetic substances? Explain properties of paramagnetic substances.

  B) Explain oral respiratory tract. **[4]**

Q5) Write a short note on any <u>Four</u> of the following : **[10]**

  a) Quantum size effect.

  b) Colossal magneto resistance.

  c) Mechanical property of nanomaterial.

  d) Surface plasmon resonance.

  e) Cathodoluminescence.

  f) Tribology.

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[5822]-322

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL-231: Communication Electronics

(CBCS) (2019 Pattern) (Semester - III) (23221)

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 carries equal marks.*

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

a) Define frequency deviation in frequency modulation.

b) Define the Bandwidth in communication system.

c) What do you mean by IF in frequency modulation?

d) List any two disadvantages of PAM.

e) What is mean by multiplexing process in communication?

f) Define PSK (Phase Shift Keying) in digital communication.

Q2) Attempt the following :

a) i) What are the advantages of Digital communication system? **[2]**

ii) What is mean by Electromagnetic spectrum? Draw the diagram of EM spectrum. **[4]**

b) Explain the process of Amplitude Modulation with proper waveform.**[4]**

Q3) Attempt the following :

    a) i)   Define Modulation process.   **[2]**

        ii)   Write comparison between serial & parallel communication.   **[4]**

    b) In AM modulated spectrum $P_T = 120$ Watt is used, calculate the P_{USB}, P_{LSB} and P_C.   **[4]**

Q4) Attempt the following :

    a) i)   If the signal frequency is 200 KHz, calculate the wavelength of signal.   **[2]**

        ii)   Explain the importance of modulation index in AM.   **[4]**

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

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

    a) Explain the diagram of 8-QAM system.

    b) Explain PWM with block diagram. Write its advantages.

    c) Write a note on "Need of Modulation".

    d) Define Duplex communication system, write its examples.

    e) Explain the working of Varactor diode.

    f) Draw the block diagram of PPM Generator. Give its advantages and disadvantages.

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[5822]-323

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL-232: Digital System Design

(23222) (CBCS) (2019 Pattern) (Semester - III) (Paper - II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

1) *Q.1 is compulsory.*
2) *Solve any Three questions from Q2 to Q5.*
3) *Q2 to Q5 carry equal marks.*

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

   a) Write down excitation table of JK F/F.

   b) Calculate the resolution for 3 bit DAC.

   c) Define pair and quad in K-map.

   d) What is state equation?

   e) What is main advantage of flash ADC?

   f) Which gate is used for event detection?

Q2) Attempt the following :

   a) i) Describe odd and even parity with suitable example.   **[2]**

      ii) Explain working of AMD gate as frequency measurement.   **[4]**

   b) Give the steps of counter design process using state machines.   **[4]**

Q3) Attempt the following :

    a) i)   Define accuracy and resolution in case of DAC. **[2]**

        ii)   Explain Mod-5 counter with state diagram and circuit diagram. **[4]**

    b) Calculate the output voltage of 4-bit R-2R type DAC
       (Given log 1 = 20V, logic 0= 0V) **[4]**
       i)   0001
       ii)   0010

Q4) Attempt the following :

    a) i)   Why Ex-OR gate is most suitable for parity checking. **[2]**

        ii)   Explain with neat diagram CMOS inverter. **[4]**

    b) What is priority encoder? Draw the block diagram of priority encoder and write its truth table. **[4]**

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

    a) Explain NOT gate as a squarewave generator.

    b) Write a short note on "Error detection techniques".

    c) Explain in brief "State diagram."

    d) What is sequence generator? Explain it in brief.

    e) Describe the working of counter type ADC.

    f) Write a short note on ADC IC 0808.

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[5822]-324
S.Y. B.Sc. (Regular)
PSYCHOLOGY
Psychology of Adjustment (Paper - I)
(2019 Pattern) (Credit System) (New) (Semester - III) (23201)

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.*

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

  a) Define adjustment.

  b) Define happiness.

  c) State the types of conflict.

  d) What is marital adjustment?

  e) Define loneliness.

  f) What is coping?

Q2) a) Explain the roots of happiness. **[6]**

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

Describe the various component of communication.

  b) Critically evaluate the conflict managing styles. **[4]**

Q3) a) Discuss different approaches to study behavior. **[6]**

OR

Elaborate the marital adjustment across the family life cycle.

b) Analyze the different types of parenting style. **[4]**

Q4) a) Examine the Super's career development model. **[6]**

OR

Describe in brief various steps in assertiveness training.

b) Investigate the different roots of happiness. **[4]**

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

a) Interpersonal communication.

b) Sound study habit.

c) Dimensions of child rearing.

d) Self Control.

e) Job Stress.

f) Punishment as effective parenting style.

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[5822]-325

S.Y. B.Sc.

PSYCHOLOGY

Research Methods in Behavioural Sciences

(Credit System) (2019 Pattern) (Semester - III) (Paper - II) (23202)

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.

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

a)   What is non-experimental research?

b)   Define Probability sampling.

c)   What is the meaning of element in sampling.

d)   Define interview as a data collection method.

e)   What is research report?

f)   State the stages of research report writing.

Q2) a)   What are the factors influencing on decision of sampling.   **[6]**

OR

Explain the advantages and disadvantages of Psychological tests as a data collection method.

b)   Elaborate the process of data collection in research.   **[4]**

Q3) a) Discuss the process and implication of experimental research. **[6]**

OR

Describe the application of information technology in research.

b) Analyze the advantages & disadvantages of non-experimental research. **[4]**

Q4) a) Compare the interview and case study method of data collection **[6]**

OR

Sketch the structure of research report.

b) Compare the advantages and disadvantages of Probability and non probability sampling. **[4]**

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

a) Importance of Research.

b) Need of Sampling.

c) Participative observation.

d) Need of interpretation.

e) Steps in research.

f) Important concepts in Sampling.

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[5822]-326

S.Y. B.Sc.

ENVIRONMENTAL SCIENCE

EVS : 231 : Ecology and Ecosystem

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

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

Instructions to the candidates:

1) Q. 1 is compulsory.

2) Solve any three questions from Q.2 to Q5.

3) Questions from 2 to 5 carries equal marks.

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

    a) Who define the term of Ecology?

    b) What is mean by Therophyte?

    c) What is mean by biotic component?

    d) Define standing crop.

    e) What is mean by crude density?

    f) Define Parasitism?

Q2) a) Explain with neat labelled diagram of Energy flow model.   **[6]**

    b) Why ecology is an Interdisciplinary nature.   **[4]**

Q3) a) Explain in detail Food web with any one example.   **[6]**

    b) Explain in detail Ecological pyramids.   **[4]**

Q4) a) What is mean by succession? Explain in detail their types with example.   **[6]**

    b) Explain in detail with neat labelled diagram of Hydrological cycle.   **[4]**

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

   a)   Habitat types.

   b)   Macronutrient

   c)   Human Impact on Biogeochemical cycles.

   d)   Dispersion

   e)   Edge Effect

   f)   Food chain

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[5822]-327

S.Y. B.Sc. (Regular)

ENVIRONMENTAL SCIENCE

EVS - 232 : Natural Resources Conservation and Management

(2019 Pattern) (Credit System) (Semester - III) (Paper - II) (23242)

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 from 2 to 5 carries equal marks.

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

a) Difference between Renewable and Non Renewable energy resources.

b) Enlist any 2 functions of Forest.

c) Enlist any 2 negative impacts of mining on the environment.

d) Full form of GMO.

e) Define the term sustainable agriculture.

f) Enlist any 2 traditional methods of water conservation.

Q2) a) Write short note on - Green Revolution in India. **[6]**

b) Explain in detail water shed management. **[4]**

Q3) a) Write short note on causes of soil degradation. **[6]**

b) Explain in detail ground water pollution. **[4]**

Q4) a) Write short note on Traditional methods of water conservation in India.**[6]**

b) Sustainable Agriculture. **[4]**

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

   a)   Joint Forest Management (JFM).

   b)   Cultural significance of Natural Resources.

   c)   Importance of Forest Resources.

   d)   Ground water Recharge.

   e)   World Food Problems.

   f)   Flood Plain Management.

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[5822]-328
S.Y. B.Sc.
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 'Security'.

   b)   What is Artificial Technology?

   c)   Define 'Technology'.

   d)   What is 'Science'?

   e)   Define 'Transfer Technology'.

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

   a)   Armaments Technology.

   b)   National Security.

   c)   Aircraft Technology.

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

    a)   Explain the impact of Science & Technology in National Security.

    b)   State in detail 'Military Technology'.

    c)   Explain the Submarine Technology.

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

    a)   State the impact of Science & Technology in National Security.

    b)   Explain in detail the Space Vehicles Technology.

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S.Y. B.Sc. (Regular)

DEFENCE & STRATEGIC STUDIES

DS-202 : Military Geography & Geopolitics

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

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 Buffer States.

   b)   Define Land-Locked States.

   c)   Define Nation-States.

   d)   Define Military Geography.

   e)   Define Geopolitics.

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

   a)   Land Power Theory.

   b)   Geopolitics.

   c)   Grand Strategy.

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

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

   b)   Explain the Meaning & Concepts of Geopolitics.

   c)   Explain the Tactics - Definition, Meaning & Concepts.

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

   a) Explain in detail the Strategy - Meaning, Definition, Importance of Strategy During Peace & War.

   b) Explain in detail the Rim Land Theory.

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

DEFENCE & STRATEGIC STUDIES

DS - 203 : Contemporary Warfare

(23233) (2019 Pattern)

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 contemporary Warfare.

b) Define Defence.

c) Define Security.

d) Define Energy security.

e) Define Human Rights.

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

a) Comprehensive Security.

b) Environmental Security.

c) Civil War.

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

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

b) State the India and USA relation.

c) Explain the India & Russia relation.

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

    a)   Discuss in detail the Emerging presence of China in the Indian Ocean.

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

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[5822]-331

S.Y. B.Sc.

AECC-II A LANGUAGE - ENGLISH

Ability Enhancement

(2019 Pattern) (Credit System) (23231) (Semester - III) (Regular)

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 to 200 words. **[15]**

    a) Discuss the central theme of the poem 'La Belle Dame Sans Merci'.

    b) Discuss the theme of love in the story "A Shadow".

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

    a) Frame a dialogue on conveying your apology to your teacher for not submitting the project in time.

    b) Write a dialogue on requesting your neighbour to give his car for emergency resiliation.

    c) Write a dialogue on conveying your inavailability to your cousin for going to shopping with him or her.

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

    a) Write a note on the various Parameters of evaluation of Group Discussion.

    b) Prepare a power point presentation of five slides on the newly launched "grocery App".

    c) Write a job application letter for the Post of a Project Manager at pharmaceutical company.

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S.Y. B.Sc. (Regular)

MARATHI (मराठी)

AECC - 2B : उपयोजित मराठी (23331)
(2019 Pattern) (Semester - III) (Theory) (CBCS)

वेळ : 2 तास]

[एकूण गुण : 35

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

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

i)   श्राव्य माध्यमाच्या भाषेची दोन वैशिष्ट्ये लिहा.

ii)   प्रसार माध्यमांचे दोन उद्देश लिहा.

iii)   व्यवहारभाषा म्हणजे काय?

iv)   साहित्याची भाषा म्हणजे काय?

v)   कार्यालयीन भाषा म्हणजे काय?

vi)   व्यवहारभाषा व कार्यालयीन भाषा यातील फरक लिहा.

vii)   पारिभाषिक संज्ञा कोणत्या प्रकारच्या भाषेत वापरल्या जातात?

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

i)   आपल्या महाविद्यालयातील प्राचार्यांच्या नावे फी सवलतीबाबत विनंती अर्ज लिहा.

ii)   संगणकीय अर्जलेखनात युनिकोडची आवश्यकता लिहा.

iii)   बँक ऑफ महाराष्ट्र या बँकेत शाखाधिकारी पदासाठी स्वपरिचय लिहा.

P.T.O.

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

   i)   'औषधी वनस्पतींचे संवर्धन' या विषयावर वर्तमानपत्रासाठी लेख लिहा.

   ii) 'पशुसंवर्धन' या विषयावर आकाशवाणीसाठी भाषण लिहा.

   iii) 'कोरोना प्रतिबंधात्मक काळजी' या विषयावर दूरदर्शनसाठी माहितीपट तयार करा.

प्रश्न 3)   खालीलपैकी कोणत्याही एका प्रश्नांचे उत्तरे लिहा.   [5]

   i)   'योगा: आरोग्याची गुरूकिल्ली' या विषयावर ब्लॉगलेखन करा.

   ii) 'आजचा युवक आणि वैज्ञानिक दृष्टिकोन' या विषयावर फेसबुकसाठी लेखन करा.

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[5822]-333

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

HINDI

AECC - II C : हिंदी काव्य तथा कहानी साहित्य

(2019 Pattern) (Credit System) (23341) (Regular)

पाठ्यपुस्तक – साहित्य संगम – संपादक – प्रो. डॉ. सदानंद भोसले

समय : 2 घण्टे]   *[पूर्णांक : 35*

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

प्रश्न 1)   निम्नलिखित में से किन्हीं <u>दो</u> प्रश्नों के उत्तर लिखिए :   **[15]**

   i)   कविनागार्जुन ने अकाल की स्थिति का वर्णन कैसे किया है?

   ii)   'कहाँ तो तय था चिरागाँ हर एक घर के लिए' कविता का भावार्थ अपने शब्दों में लिखिए ।

   iii)   'इसको भी अपनाता चल' कविता में कवि ने क्या संदेश दिया है?

   iv)   'पालतु कुत्ता' में मालती शर्मा ने स्त्री जीवन की वेदना किस प्रकार व्यक्त की है?

   v)   श्रीप्रकाश शुक्ल ने घर के प्रति लगाव को किस प्रकार व्यक्त किया है?

प्रश्न 2)   निम्नलिखित में से किन्हीं <u>दो</u> प्रश्नों के उत्तर लिखिए :   **[15]**

   i)   'उसने कहा था' कहानी में देशप्रेम की भावना किस प्रकार व्यक्त हुई है?

   ii)   अन्धी भिखारिन का चरित्र चित्रण कीजिए ।

   iii)   'ककड़ी की कीमत' कहानी में लोगों की खोखली मान्यताएँ किस प्रकार व्यक्त हुई है?

   iv)   'कप्तान' कहानी का सारांश अपने शब्दों में लिखिए ।

   v)   'बदबू' कहानी में किस समस्या को अंकित किया है?

प्रश्न 3)   निम्नलिखित में से किसी <u>एक</u> प्रश्न का उत्तर लिखिए :   **[5]**

   i)   'ककड़ी की कीमत' के लाला शिवप्रसाद जी ने जहर क्यों खाया?

   ii)   कवि नागार्जुन ने अकाल के बाद की स्थिति का वर्णन किस प्रकार किया है?

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S.Y. B.Sc.

SANSKRIT (Regular)

AECC - II E : Girvāṇabhāratī (23351)

गीर्वाणभारती (निवडक संस्कृत वेचे)

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

Time : 2 Hours]   *[Max. Marks : 40*

सूचना :– 1) सर्व प्रश्न अनिवार्य आहेत.
   All questions are compulsory.

2) उजवीकडील अंक पूर्ण गुण दर्शवितात.
   Figures to the right indicate full marks.

Q1) Write an answer in 2-4 lines on the following questions.   **[16]**
पुढील प्रश्नांची दोन ते चार ओळीत उत्तरे लिहा.

  i) From which upaniṣad सत्यकामजाबालकथा has taken?
      सत्यकामजाबालकथा कोणत्या उपनिषदातून घेतली आहे?

  ii) How many अध्याया is included in शतपथब्राह्मणा?
      शतपथब्राह्मणात किती अध्याय समाविष्ट आहेत?

  iii) Who is the ऋत्विज of यजुर्वेद?
      यजुर्वेदाचा ऋत्विज कोण?

  iv) Who is the wife of दुष्यन्त?
      दुष्यन्ताची पत्नी कोण?

  v) Who ase the twin gods in veda?
      वेदातील जुळे देव कोणते?

  vi) Who was शर्यात?
      शर्यात कोण होता?

  vii) Which terms are discussed in उपनिषद्?
      उपनिषदात कोणत्या संकल्पनांचा विचार केला आहे?

  viii) Who is the adviser of प्रकाशवान् पाद?
      प्रकाशवान पादाचा उपदेशकर्ता कोण?

Q2) Write short notes (any two)   **[8]**

टीपा लिहा (कोणत्याही दोन)

i)   ब्रह्मविद्या

ii)   सत्यकाम:

iii) कालिदास:

Q3) Write short notes (any two)   **[8]**

टीपा लिहा (कोणत्याही दोन)

i)   उपदेश :

ii)   मानसपूजा

iii) हनुमान्

Q4) Explain the line 'अर्थो हि कन्या परकीय एव'   **[8]**

'अर्थो हि कन्या परकीय एव' ही ओळ स्पष्ट करा.

<div align="center">किंवा/OR</div>

Explain the Importance of स्तोत्रवाङ्मय

स्तोत्रवाङ्मयाचे महत्त्व स्पष्ट करा.

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[5822]-335
S.Y.B.Sc.
AECC-II D LANGUAGE : ARABIC FUNCTIONAL
(2019 Pattern) (Semester - III) (23371) (Regular)
(Credit System)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:
1) *Attempt all questions.*
2) *Figures to the right side indicate full marks.*

Q1) Define and illustrate any <u>two</u> of the following Grammar: **[10]**

١) اَسُمَاءُ لا شِارَة۔

٢) مبتداء والخبر۔

٣) حُرُوفُ الهِجَاء۔

Q2) Translate into English Only: **[10]**

١) تِلْكَ السَّيَّارَةُ جَمِيلَةٌ ۔

٢) اَلْمُدَرِّسُ مَشْغُولٌ ۔

٣) اَلْكُرْسِّيُ مُرسِيحٌ ۔

٤) اَلْوَلَدُذَكِىٌّ۔

٥) هٰذِهِ اَلْمَدُرَسَةُ جَيِّدَةٌ ۔

P.T.O.

Q3) Translate into <u>Arabic</u> Only: [10]

    i)   Ali is returning with Fatima from the market.

    ii) That Bus is going to the University.

    iii) This Bus is coming from the college.

    iv) The Girl is sitting on the chair.

    v) The student is going to the school.

Q4) Write the <u>term</u> in <u>Arabic</u> : [5]

    i)   Voltage

    ii)   Solid

    iii) Coolness

    iv) Motion

    v)   Heat

    vi) Radiation

    vii) Freezing

    viii) Melting

    ix) Hygiene

    x)   Mercury

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S.Y. B.Sc. (VOCATIONAL)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

CHNA 231 : Operating System & Diagnostics Tools

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

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: **[5×1=5]**

    a) List different types of virus scans.

    b) List the services provided by an operating system.

    c) What is graphics card?

    d) Write the benefits of preventive maintenance.

    e) Write different uses of MS office.

    f) What is NTFS and How does it works?

Q2) a)   i)   Explain the effect of virus on computer in short.   **[2]**

        ii)   Explain the preventive maintenance schedule of PC.   **[4]**

    b) Explain small computer system Interface card in brief.   **[4]**

Q3) a)   i)   What are the different types of operating system.   **[2]**

        ii)   Write short note on: **[4]**

           1) Google chrome

           2) Web camera

    b) Explain multi boot operating system   **[4]**

Q4) a) i) What is antivirus removal tool? [2]

ii) Write installation steps of new graphics card. [4]

b) Explain wireless Local Area Network in brief. [4]

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

a) Wireless LAN card.

b) Electrical power issues occurs in PC.

c) FAT and NTFS system.

d) Flash card.

e) Auto-CAD software.

f) M.S DOS 6.22.

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[5822]-337

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

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) *Question 2 to 5 carry equal marks.*

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

a) What is cache memory.

b) Write any two control flag's in flag register of 8086 microprocessor.

c) List any two Non-intel processors.

d) What is fullform of USB.

e) Define accuracy of DAC.

f) How to put 8086 microprocessor to maximum mode.

Q2) a) i) What is ADC? Explain working of any one type of ADC.   **[4]**

ii) What is transducer? List any two transducers.   **[2]**

b) What is function of BUS? Explain feature of PCI bus.   **[4]**

Q3) a) i) What is interrupt? Name any one software interrupt.   **[2]**

ii) Explain in short DMA controller.   **[4]**

b) Write short note on DRAM.   **[4]**

Q4) a) i)   What Xeon processor?   **[2]**

        ii) Describe methods of parallel data transfer with timing diagrams?

                                                                                         [4]

    b) What are the main features of core is processor.   **[4]**

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

    a) Pentium processor

    b) R-2R DAC

    c) DOS and BIOS interrupts

    d) 8086 flag register

    e) Bus architecture

    f) Maximum mode of 8086

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S.Y. B.Sc. (Vocational Paper - III)
BIOTECHNOLOGY
VBt - 211 : CELL BIOLOGY AND MICROBIAL GENETICS
(CBCS) (2019 Pattern) (Semester - III) (23571)

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

Instructions to the candidates:

    1)   *Q. 1 is compulsory.*

    2)   *Solve any 3 from Q. 2 to Q. 5.*

    3)   *Q. 2 to Q. 5 carry equal marks.*

    4)   *Draw neat labelled diagrams wherever necessary.*

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

    a)   Mention two types of cell.

    b)   Define recombination.

    c)   Give full from of ECM.

    d)   Give functions of mitochondria.

    e)   What are cell junctions?

    f)   Define cell theory.

Q2) A)   Answer the following. (Any Two) **[6]**

    a)   Explain in detail Hemidesmosomes as cell junction molecule.

    b)   What is transduction. Explain any one type of transduction.

    c)   Draw and explain Animal cell.

   B)   Answer the following. (Any one) **[4]**

    a)   Draw and explain Fluid Mosaic Model.

    b)   Explain signalling in cell death.

P.T.O.

Q3) A) Answer the following. (Any Two) [6]

    a) Explain Lederberg and Tatun experiment in detail.

    b) Draw and explain structure of mitochondria.

    c) Draw and explain structure of typical cell.

   B) Answer the following. (Any one) [4]

    a) Distinguish between generalized and specialized Transduction.

    b) Why cell to cell interaction is necessary? Explain with example.

Q4) A) Answer the following. (Any Two) [6]

    a) Explain homologus recombination in detail.

    b) Explain G-protein pathway in detail.

    c) Distinguish between intrinsic and extrinsic pathway.

   B) Answer the following. (Any one) [4]

    a) Give an overview of Membrane Transport.

    b) What is conjugation. Give significance of conjugation.

Q5) Write short notes on following. [10]

    a) Lysosomes

    b) Gap junction

    c) Cadherins

    d) Hfr conjugation.

    e) Neoplasia.

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S.Y. B.Sc. (Biotechnology)

VBt - 212 : Molecular Biology (Vocational Paper - IV)

(2019 Pattern) (CBCS) (Semester - III) (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) *Q.2 to Q.5 carry equal marks.*
4) *Draw neat labelled diagram wherever necessary.*

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

a) Define nucleotide.

b) What is meant by glycosidic bond?

c) What is chromatin?

d) Define telomeres.

e) What is glycosylation?

f) State the chargaff rule.

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

i) Explain the steps involved in initiation of transcription in Prokaryotes.

ii) Describe the nucleosome model and chromatosome model of eukaryotic genome Organization.

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

b) Describe the structure of ribosomes in detail. **[4]**

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

    i)   What is the function of aminoacyl t-RNA synthetase? Distinguish between class I and class II aminoacyl-t-RNA synthetases.

    ii)   Write a short note on alkylating agents.

    iii) Explain the inhibitors of translation in prokaryotes and eukaryotes.

  b) Write a short note on intron removal process.   **[4]**

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

    i)   Explain any one post translational modification in detail.

    ii)   Describe any three types of DNA polymerases in prokaryotes.

    iii) Define genome. What is linking number? Give its formula.

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

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

  a) Features of translation.

  b) Role of Pre-Rc involved in eukaryotic initiation of replication.

  c) Any 2 features of watson and Crick model of DNA.

  d) Intercalating agents.

  e) Features of prokaryotic m-RNA.

  f) Central dogma of molecular biology.

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S.Y. B.Sc. (Vocational)
SEED TECHNOLOGY
ST 2.1 : Hybrid Seed Production
(2 Credits) (2019 Pattern) (CBCS) (Semester -III) (23891)

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 Hybrid Seed Production

  b)   Enlist types of Variety

  c)   Define Heterosis

  d)   Give any one significance of Apomixes

  e)   What is GMS?

  f)   Define Gametocides.

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

  b)   Describe pollen viability   **[4]**

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

  b)   Describe Compact Area Approach.   **[4]**

Q4) a) Explain heteromorphic system of self-incompatibility. **[6]**

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

Q5) Write short notes on any FOUR of the following: **[10]**
   a) Genetic basis of inbreeding depression
   b) Manual emasculation and hand pollination
   c) Planting ratio and seed rate
   d) Seed Production of A, B and R line
   e) Pollen storage
   f) Stigma receptivity

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SEAT No. : ☐

[Total No. of Pages : 2

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

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 Q.5 carry equal marks.*

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

a) Give any one importance of seed testing.

b) Define composite sample.

c) What is service sample?

d) Define inert matter component.

e) What is normal seedling?

f) Define seed vigour testing.

Q2) a) Explain tools / equipments used for sampling. [6]

b) Describe procedure of registration of sample in STL. [4]

Q3) a) Explain ODV test. [6]

b) Describe soil method of germination testing. [4]

Q4) a) Explain Universal OSAW moisture tester. [6]

b) Write a note on staff related to STL. [4]

P.T.O.

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

    a) Association of official seed analysts.

    b) Layout for STL.

    c) Principle of seed vigour testing.

    d) Storage of guard samples.

    e) General principle of germination testing.

    f) Ungerminated seeds.

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S.Y. B.Sc.
INDUSTRIAL MICROBIOLOGY (Vocational Paper - III)
IMB - 211 : Bioreactor - Design & Operation
(2019 Pattern) (CBCS) (Semester - III) (23821)

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 <u>Five</u> of the following :   **[5]**

  a)   What is meant by wastewater treatment?

  b)   Why are cooling towers required in fermentation plant?

  c)   What is function of sparger?

  d)   What is pH electrode?

  e)   What is pt 100?

  f)   Which material can be used for construction of large scale fermenter?

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

    i)   Draw a well labelled diagram for CSTR.

    ii)   Draw the diagram for pH meter. Mention electrode and electrolyte combination.

    iii)   Explain construction and working of Fluidized Bed reactor.

    iv)   Draw the diagram for foam sensor and controller.

  b)   Write a short note on Bioreactor on Chips.   **[4]**

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

   i)   Explain primary treatment in wastewater management.

   ii)   What is clarifies? Why are they used in wastewater treatment?

   iii) Explain in brief utilities required for fermentation plant.

   iv)   What is the purpose of using screens in pre-primary treatment of wastewater?

   b)   Write a short note on Hollow fibre reactor.   **[4]**

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

   i)   Write a short note on Batch fermentation.

   ii)   Draw diagram for dissolved O_2 sensor.

   iii) Can thermometer be used in measuring temperature of large scale fermenter? Justify your answer.

   iv)   What are cooling towers and why are they used in fermentation facility?

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

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

   a)   Activated lagoons.

   b)   Trickling filters.

   c)   Single use bioreactor.

   d)   Online and Offline sensors.

   e)   Data analysis.

   f)   Impeller and Baffles

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S.Y. B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY (Paper - IV)
IMB-212: Screening and Process Optimization
(CBCS) (2019 Pattern) (Semester - III) (23822)

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

Instructions to the candidates:

   1)   *Q1 is compulsory.*

   2)   *Solve any three questions from Q2 to Q5.*

   3)   *Q2 to Q5 carry equal marks.*

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

   a)   What is the significance of crowded plate technique?

   b)   Enlist any two important process parameters in fermentation optimization process.

   c)   Give names of any two methods used for monitoring of cell biomass.

   d)   Name any two methods used for preservation of fungi.

   e)   What is the role of antifoam agents in media formulation?

   f)   Define "Scale up".

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

    i)   Discuss the limitations of metagenomics.

    ii)   Describe the process of strain improvement using recombinant DNA technology.

iii)   Diagrammatically represent concerted control.

iv)   Which are the important parameters required to be scaled-up during fermenter design?

b) Explain Feedback repression.   **[4]**

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

i)   Explain using a flow-diagram the process of inoculum build-up.

ii)   Explain difference between Shannon's and Simpson's diversity index.

iii) Describe biological mimicry as a method of optimization.

iv)   Explain various types of Nitrogen sources used in fermentation.

b) Write ideal characteristics of production media used in fermentation.**[4]**

Q4) a) Attempt the following :   **[6]**

i)   Discuss the need of secondary screening process of industrially important microorganisms.

ii)   Discuss the concept of analogue resistant mutant with help of suitable example.

iii) Explain correlation between del'factor and media sterilization.

iv)   Explain major factors involved in scale-up fermentation process.

b) Write ideal characteristics of strain.   **[4]**

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

a) Cryo-preservation.

b) Auxotrophic mutant.

c) Buffers used in media formulation.

d) Temperature as process parameter in fermentation.

e) OFAT.

f) O-R potential as process parameter in fermentation.

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S.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

EEM - 231 : Basic Level Maintenance of Smart Phone

(2019 Pattern) (Semester - III) (Paper - III) (23811)

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

Instructions to the candidates:

1)   *Q.1 is compulsory.*

2)   *Q.2 to Q.5 carry equal marks*

3)   *Solve any Three questions from Q.2 to Q.5. .*

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

a)   What is CDMA?

b)   What is cluster?

c)   What is SOC in mobile components?

d)   What are different generations of mobile phone?

e)   What is function of MODEM?

f)   What is role of compass in mobile phone?

Q2) a)   Answer the following :

i)   How does PSTN works?   **[3]**

ii)   What are recent developments in Wireless LAN?   **[3]**

b)   Explain the working of transreceiver.   **[4]**

Q3) a)   Answer the following :

i)   What is Bluetooth? How it works?   **[3]**

ii)   What is SD card? Explain.   **[3]**

b)   Explain in brief working of accelerometer in smartphone.   **[4]**

Q4) a) Answer the following :

      i) What are different types of sensors? **[3]**

      ii) Explain the working of MTSO. **[3]**

  b) Explain the working of TDMA communication system in brief. **[4]**

Q5) Write short notes on any <u>Four</u> of the following : **[10]**

  a) Wi - Fi

  b) Basics of Android Operating System.

  c) DC power supply.

  d) Test JIG Box.

  e) TFT - LCD Display & AMOLED Display.

  f) Cellular system architecture component "Cell".

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[5822]-345
S.Y. B.Sc. (Vocational)
ELECTRONIC EQUIPMENT MAINTENANCE
VOC - EEM - 232 : Smart Phone Based Electronic Equipment Design (Paper - IV)
(2019 Pattern) (CBCS) (Semester - III) (23812)

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 <u>Five</u> of the following : **[5]**

a) Can you use smartphone as thermostat?

b) List Any Four parts of smartphone based electronic Equipment.

c) What are basics of Arduino?

d) What are three main parts of Arduino program?

e) What is Arduino?

f) How many digital I/OS are available to Arduino Uno?

Q2) a) Answer the following :

    i) What are functions of each pin of Arduino Uno? **[3]**

    ii) What are basic functions of Arduino technology? **[3]**

b) What are advantages of Arduino technology? **[4]**

Q3) a) Answer the following :

   i)   What is serial communication? What are it's advantages? **[3]**

   ii)   What are different types of USB adaptors? **[3]**

   b)   Write a program to blink LED on Arduino UNO. **[4]**

Q4) a) Answer the following :

   i)   How to create a webview inside widget for an Android? **[3]**

   ii)   What is difference in mobile & ubiquitous computing? **[3]**

   b)   What is android studio used for? **[4]**

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

   a)   Give any four examples of android UI.

   b)   Explain any two android app components.

   c)   "Fragments in Android." Explain.

   d)   "Types of Animation techniques." Discuss.

   e)   "Working Principle of android - Bluetooth module." Explain in brief.

   f)   "Hardware requirement of Android & bluetooth module to control LED through android app." Write a short note on it.

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[5822]-346

S.Y. B.Sc.
GEOLOGY (Regular)
GL - 212 : Principles of Stratigraphy and Sedimentation
(2019 Pattern) (Semester - III) (23162 A)

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

Instructions to the candidates:

   1)   *Q.1 is compulsory.*

   2)   *Solve any 3 questions form Q.2 to Q.5.*

   3)   *Q.2 to Q.5 carry equal marks.*

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

   a)   What is Biostratigraphy?

   b)   What is Conglomerate?

   c)   Define Sedimentary Environment.

   d)   Enlist chronostratigraphic units.

   e)   What is graded bedding?

   f)   What is lamination?

Q2)   a)   Define weathering. Explain mechanical and chemical weathering.   **[6]**

       b)   Define stratigraphy. Name stratigraphic procedures on outcrop for stratigraphic data collection.   **[4]**

Q3)   a)   Enlist Pene contemporaneous sedimentary structures. Explain any Two of them.   **[6]**

       b)   Define sedimentary texture. Explain clastic and Non-clastic texture. **[4]**

Q4)   a)   What is argillaceous sedimentary rock? Explain mudstone and shale.**[6]**

       b)   Explain derivation of sediments refering to source of sediments.   **[4]**

Q5) Write a note on (any four) :   **[10]**

   a)   Importance of stratigraphy.

   b)   Define competence and capacity of sediment transportation.

   c)   What is sandstone?

   d)   Enlist continental sedimentary environment. Explain any one of them.

   e)   Ripple Marks.

   f)   Tracks and Trails.

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