[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1886 **GC-4**

Unique Paper Code : 42341202

Name of the Paper : Database Management Systems

Name of the Course : **B.Sc. Prog./Mathematical SC**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates:

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **Section A** is compulsory.
3. Attempt any **five** question from **Section B.**

Section A

1. Answer the following: (25)

   (a) What are the responsibilities of DBA (2)

   (b) List two main types of DMLs. What is the main difference between the two? (2)

(c) List the various cases where use of a null value would be appropriate. (2)

(d) Define the terms: Metadata and Derived attribute. (2)

(e) Differentiate between Specialization and Generalization (2)

(f) What is the distinction between a database schema and a database state? (3)

(g) Define normalization. What dependencies are avoided when a relation is in 2NF? (3)

(h) List and explain any three unary relational algebraic operations. (3)

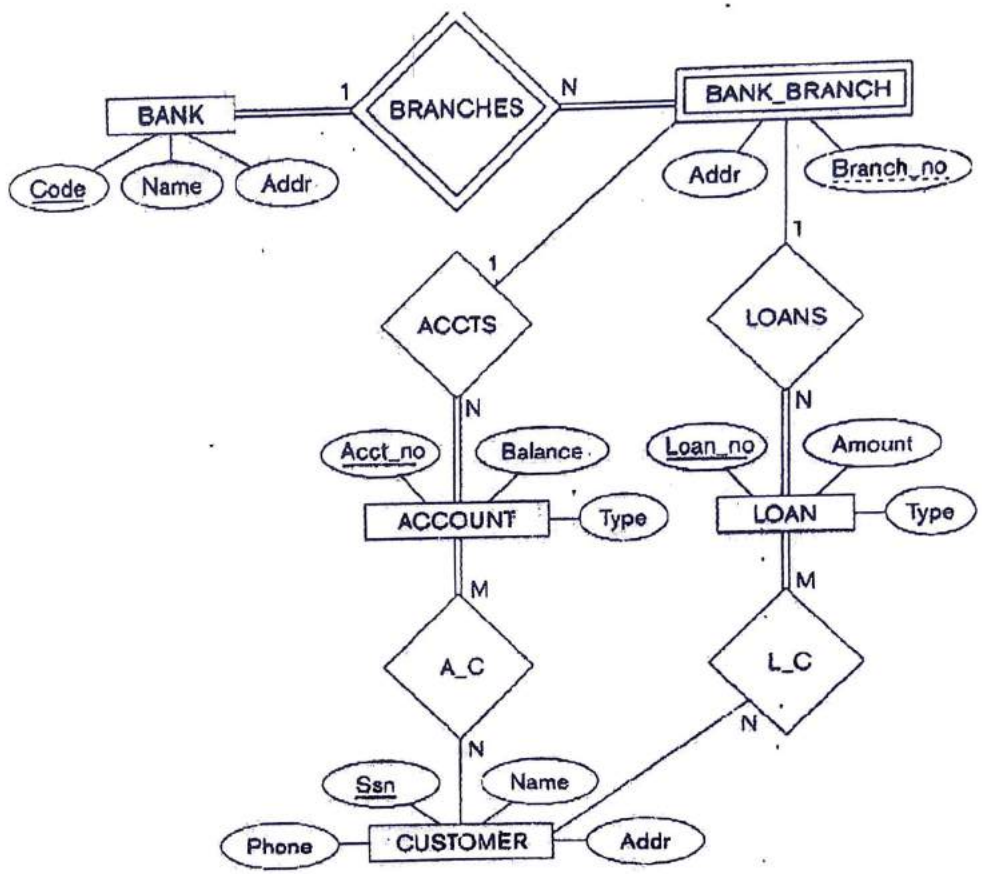
(i) What is the difference between logical data independence and physical data independence? (3)

(j) Define foreign key. What is it's purpose? (3)

Section B

2. (a) Discuss the main characteristics of the database approach and how it is different from traditional file systems. (5)

(b) Consider the ER diagram shown below for a BANK database. (5)



(i) List the entity types in the ER diagram.

(ii) Give the name of the weak entity type, its partial key, and the identifying relationship.

(iii) Suppose that every customer is restricted to at most two loans at a time. How does this show up on the (min, max) constraints?

P.T.O.

3. (a) Describe the three- schema architecture. Why do we need mappings between schema levels. (5)

(b) Consider the following relational database. Give an expression in relational algebra to express each of the following queries(attributes have their usual meaning): (5)

EMPLOYEE (**employee_id**, employee_name, street, city, salary);

COMPANY (**company_id**, company_name, city);

WORKS (**Emp_id**, Comp_id, hours);

(i) List the Company id and company name of all the companies.

(ii) Find the names of all employees who live in city **Mumbai** and salary is greater than Rs. 30,000.

(iii) Find the names of all companies based in **Delhi**

(iv) Rename the attributes emp_id and comp_id as employee_id and Company_id respectively.

4. (a) Discuss the entity integrity and referential integrity constraints. Why is each considered important? (5)

(b) Consider the universal relation R={A, B, C, D, E, F, G, H, I, J} and the following set of functional dependencies: (5)

AB→C

A→DE

B→F

F→GH

D→IJ

What is the key for R? Decompose R into 2NF relations.

5. (a) Consider the following relations for a database that keeps track of business trips of salesperson in a sales office (attributes have their usual meanings): (5)

SALESPERSON (Sid, Name, Start_Year, Dept_No)

TRIP (Sid, From_City, To_City, Departure_Date, Return_Date, Trip_Id)

EXPENSE (Trip_Id, Account#, Amount)

Specify the Primary keys and foreign keys for this schema. State any assumptions that you make in identifying the keys.

(b) Explain third normal form. How does it differ from 2NF? (5)

6. (a) Explain with the help of an example how can the following ER model constructs be mapped to the relational database tables: (Any **Two**) (5)

(i) Weak Entity Types

(ii) Binary M:N Relationship Types

(iii) Multivalued Attributes

(b) Perform the operations mentioned below on the following tables (attributes have their usual meaning): (5)

Student(rollno, name, age, dno)

Department(dno, dname)

Student

101	**Amit**	**18**	**D1**
102	**Ankit**	**19**	**D3**
103	**Pooja**	**18**	**D1**
104	**Suresh**	**18**	**D2**

Department

D1	**Computer Science**
D2	**Physics**
D3	**Mathematics**

(i) Join

(ii) Cartesian Product

7. Consider the following relational database (attributes have their usual meaning): (10)

Supplier (S, Sname, Status, City)

Part (P#, Pname, Color, Weight, City)

Project (J#, Jname, City)

Shipment (S#, P#, J#, Qty)

Write SQL commands to express each of the following queries:

(i) Get supplier number and status of all **'Delhi'** suppliers in decreasing order of status.

(ii) Get supplier names for suppliers who supply part **'P2'**.

(iii) For each part supplied, get the part number and total quantity supplied for that part.

(iv) Change the color of part **'P2'** to yellow and increase its weight by 5.

(v) Insert a new tuple into the relation Part.

8. Explain the following: (10)

(a) Cardinality Ratio

(b) DifferentTypes of Database End Users

(c) Primary key and a super key

(d) Recursive Relationship

(e) Disjointness constraint on specialization

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper	:	**1888** GC-4
Unique Paper Code	:	42221201
Name of the Paper	:	Electricity, Magnetism and EMT
Name of the Course	:	**B.Sc. Program**
Semester	:	II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates:

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions in all, including **Q. No. 1** which is compulsory.

1. Attempt any **five** of the following: (5x3=15)

   (a) A charge 'q' moving initially with velocity 3 $\hat{k}$ m/s enters a region with electric field, $\vec{E} = 10\ \alpha\ \hat{i}$ V/m and magnetic field, $\vec{B} = 20\ \vec{j} + 100\ \hat{k}$ Tesla. For what value of α will the Lorentz force on the charge be zero.

(b) What is the physical significance of divergence of a vector field?

(c) Five thousand lines of a electric force enter in a certain region and three thousand lines emerge from it. Find the total charge in coulomb within the region.

(d) A conductor of circular cross section of radius 'a' carries a current of uniform current density "j". Find the magnetic field at distance r > a., from the centre of the conductor.

(e) Is the electric field induced due to a changing magnetic flux a conservative field or not? Explain.

(f) Write the equation of continuity and explain its physical significance.

(g) Distinguish between self and mutual inductance.

(h) What is the relation between $\vec{E}$, $\vec{P}$ and $\vec{D}$ where the symbols have their usual meaning.

2. (a) Find a unit vector normal to the surface $xz^2 + x^2y = z - 1$, at the point (1, -3, 2). (5)

(b) Find $\vec{\nabla}$ (In r) (5)

(c) Evaluate the surface integral, $\oiint_S \vec{r}.\hat{n}\, dS$ for a spherical surface S of radius 'a' having its centre at the origin. (5)

3. (a) Prove that the energy stored per unit volume of the electric field is $\frac{1}{2}\epsilon_0 E^2$. (5)

(b) Eight identical charges of 'q' coulomb each are placed at corners of a cube of side length 'a'. Find the electric potential energy of this system of charges. (5)

(c) State and prove the Gauss's theorem in electrostatics for spherical surface (2,3)

4. (a) Find the electric potential, inside and outside a spherical shell of radius R, which carries a uniform charge Q. Set the reference point at infinity. (5)

(b) A dielectric completely fills the space between the plates of a parallel plate capacitor. Show that the induced charge varies with the dielectric as:

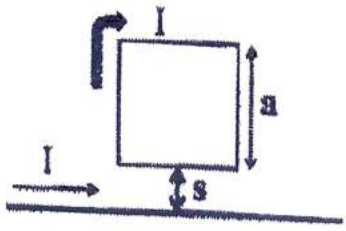
$$q' = q\left[1 - \frac{1}{k}\right] \qquad (5)$$

(c) Find out the capacitance of a cylindrical capacitor of two coaxial, cylindrical metallic shells A and B of radii 'a' and 'b' respectively and length 'l'. Assume 'q' is the charge on the inner cylinder A and outer cylinder B is grounded. (5)

5. (a) State Biot-Savart's law and find an expression for the magnetic field (B) at the centre of a square of side 'a', carrying a steady current 'I'. (2,4)

P.T.O.

(b) Find out the force on a square loop placed as shown in Figure, near an infinite straight wire. Both the loop and wire carry a steady current 'I'. (3)



(c) Distinguish between diamagnetic, paramagnetic and ferromagnetic materials. (6)

6. (a) Show that for two interacting coils, $M \leq M \leq \sqrt{L_1 . L_2}$, where the symbols have their usual meaning. (5)

(b) State Ampere's circuital law in magnetostatics, and obtain its differential form. (5)

(c) Prove that: Curl $\vec{B} = \vec{J} + \vec{J}_d$ (5)

7. (a) What is Poynting vector? Sunlight strikes the earth outside its atmosphere with intensity of 2.0 cal/cm^{2}-min. Find the peak value of **E** and **B** for sunlight at the earth. (5)

(b) Write the Maxwell's equations for vacuum. Derive electromagnetic equations and find the velocity of these waves in free space. (10)

(3000)

[This question paper contains 4 printed pages.]

(18)

18/5/17

Your Roll No......

Sr. No. of Question Paper : 1889 **GC-4**

Unique Paper Code : 42171209

Name of the Paper : ICPT-202 INDUSTRIAL CHEMISTRY (DSC-1B)

Name of the Course : **B.Sc. (Prog.)**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **six** questions in all.
3. Question No. **1** is compulsory.

1. Attempt any **five** of the following :–

   (a) Explain the term carbonization.

   (b) What is meant by catalytic and thermal reforming ? Explain.

P.T.O.

(c) Write the composition and uses of LPG.

(d) What do you know about rancidity of oils ?

(e) What is iodine value ? Write its significance.

(f) Discuss about any two artificial sweeteners. (3×5=15)

2. (a) Describe the fractions of coal-tar. Mention applications of each fractions.

(b) Explain the process of cracking. Compare the thermal and catalytic cracking processes.

(c) What do you know about octane number ? How it can be enhanced for a fuel. (4×3=12)

3. Write short notes on the following **(Any three)** :–

(a) Producer gas

(b) CNG

(c) Saponification value

(d) Surfactants (4×3=12)

4. Differentiate the followings :–

(a) Solid and semi solid lubricants

(b) Renewable and nonrenewable resources

(c) Soap and detergent (4×3=12)

5. (a) Explain the manufacturing of metallurgical coal.

(b) What is coal gasification ? Discuss hydrogasification and catalytic gasification processes. (6×2=12)

6. (a) Explain the cleansing action of soap by micelle formation.

(b) What are binders and builders of a detergent ? Explain.

(c) Classify oil and fats. Describe the estimation method for acid value of an oil. (4×3=12)

7. (a) What do you know about food flavours and food preservatives ? Explain with examples.

(b) Write notes on food colours and artificial sweeteners. (6×2=12)

8. (a) Write the composition of crude petroleum and explain about gasoline.

(b) Discuss about controlled hydrogenation of oils.

(c) What is fat splitting ? Explain. (4×3=12)

[This question paper contains 5 printed pages.]

2017

Your Roll No.....

Sr. No. of Question Paper : 1890 **GC-4**

Unique Paper Code : 42351211

Name of the Paper : Calculus and Matrices

Name of the Course : **B.Sc. (Prog.)**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instruction for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **two** from each section.

SECTION – I

1. (a) Show that the vectors (1,2,1), (1,0,–1) and (0,–3,2) form a basis of R^3. (4)

   (b) Solve the system of equation

   $x + 2y - z = 2$

   $x - y + 3z = 3$

   $2x + y + z = 4.$ (4)

P.T.O.

(c) Consider the real vector space R^3 and its subset

$$S = \{(a,b,c) : 3a - 4b + c = 0,\ a + 2b - c = 0, a,b,c \in R\}.$$

Show that S is a subspace of R^3 and give its geometric interpretation. (4)

2. (a) Let T: $R^2 \to R^2$ be defined by

$$T(x,y) = (x + y + 1,\ x - y).$$

Determine whether T is linear transformation. (4)

(b) Let $A = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix}$. Find the eigen values and the eigen vector corresponding to one of them. (4)

(c) Interpret geometrically the transformation of square ABCD (0,1), (0,1), (1,1), (1,0) under the translation by vector (1,2). (4)

3. (a) Reduce the matrix $A = \begin{bmatrix} 1 & 2 & -1 & 3 \\ 2 & 4 & 4 & 3 \\ 3 & 6 & -1 & 8 \end{bmatrix}$ to triangular form by elementary row operations and hence determine its rank. (4)

(b) Balance the following chemical equation

$$xC_4H_{10} + yO_2 \to zCO_2 + wH_2O \quad (4)$$

(c) Let T be a linear transformation as reflection in yz plane, then find the standard matrix representation of T. (4)

SECTION – II

4. (a) If $y = e^{m\cos^{-1}x}$, Show that

$$(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - (n^2 + m^2)y_n = 0. \quad (6)$$

(b) Find the n^{th} derivative of $y = \dfrac{x}{1 + 3x + 2x^2}$. (6)

(c) Draw the level curves of height k = 1,2,5 for the surface :

$$f(x, y) = 9x^2 + 25y^2. \quad (6)$$

5. (a) Sketch the graph of $y = |x - 4| + 2$. (6)

(b) A reserved forest has the capacity to preserve 100 hounds of a particular variety. Initially there were 10 such animals. The number grew to 50 in 5 years. In how many years will this number grow to 90 ? (6)

(c) If $u = \frac{1}{\sqrt{x^2+y^2+z^2}}$, show that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0$. (6)

6. (a) Verify that the function $u(x, t) = \sin(x + ct) + \cos(x - ct)$ is a solution of the wave equation

$$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}.$$ (6)

(b) Verify which of the following sequences are monotonic and bounded :

(i) $\left\langle ne^{-n} \right\rangle$

(ii) $\left\langle \frac{n!}{n^n} \right\rangle$ (6)

(c) For what values of x can we replace $\sin x$ by $x - \frac{x^3}{3!}$ with an error of magnitude not greater than 2×10^{-5} ? (6)

SECTION – III

7. (a) Describe the inequality $|z + i| < |z - 1|$ geometrically. (4)

(b) State Fundamental Theorem of Algebra and hence form an equation in lowest degree with real coefficients which has $2 + 3i$ and $3 - 2i$ as two of its roots. (3.5)

8. (a) Let z_1 and z_2 be any two complex numbers such that $|z_1 + z_2| = |z_1 - z_2|$. Then prove that $z_1 \bar{z}_2$ is purely imaginary number. (3.5)

(b) Find the radius and centre of circle

$$z\bar{z} + (2 - 3i)z + (2 + 3i)\bar{z} + 4 = 0.$$ (4)

9. (a) If $z = \cos\theta + i \sin\theta$, show that

$$\frac{z^{2n} - 1}{z^{2n} + 1} = i \tan n\theta,$$ n being an integer. (3.5)

(b) Use De-Moivre's theorem to solve the equation :

$$z^7 - z = 0.$$ (4)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1891 **GC-4**

Unique Paper Code : 42161201

Name of the Paper : Plant Ecology and Taxonomy

Name of the Course : **B.Sc. (Prog.)**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates:

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt Section A and B on **SEPARATE SHEETS.**
3. **Question No. 1** of both sections is COMPULSORY.
4. Attempt **three** questions from Section A and **three** questions from Section B including question number 1 of both sections.
5. Attempt all parts of the question together.

SECTION-A

1. (a) Define any **five** of the following : (5×1=5)

(i) Ecosystem

(ii) Population

(iii) Thermocline

(iv) Pioneer community

(v) Phytogeography

(vi) Food web

(vii) Edge effect

(b) Fill in **any five** of the blanks; (5×0.5=2.5)

(i) Instrument used to measure relative humidity is _____.

(ii) Pyramids of _____ are always upright.

(iii) Partially decomposed finely divided amorphous dark coloured organic matter in the soil is known as _____.

(iv) _____ is an example of hydrophyte.

(v) The introduction of a plant into new place is known as _____.

(vi) The diameter of a clay particle is less than _____ mm.

2. Differentiate between **any five** of the following: (5×3=15)

(i) Primary and Secondary succession

(ii) Grazing and Detritus food chain

(iii) Soil structure and Soil texture

(iv) Net productivity and Gross productivity

(v) Heliophytes and Sciophytes

(vi) Vegetation and Flora

3. Write short notes on **any three** of the following: (5×3=15)

(i) Hydrosere succession

(ii) Shelford's law of tolerance

(iii) Raunkier's life form

(iv) Cation Exchange Capacity

4. (a) What are biogeochemical cycles? Explain the cycling of Nitrogen with the help of a flow chart. (8)

(b) List the various botanical provinces of India. Explain any one province in detail. (7)

SECTION - B

1. (a) Fill in **any four** of the blanks: (4)

(i) _____ is specimen or illustration selected from original material when no type was indicated or is missing.

(ii) Lal Bagh Botanical Garden is situated in _____ city.

(iii) _____ is regarded as the Father of Botany.

(iv) *Pinax theatri botanici* is written by _____ taxonomists.

(v) _____ is the author of book *"Theorie elementaire de la botanique"*.

(vi) _____ is appended to the left side of an original label of herbarium which bears corrections.

(vii) _____ is the species name in which the genus and specific epithet are identical.

(viii) Bubble diagram to show phylogenetic relationship was given by _____.

(b) Match the following: (3.5)

(i) Phylogenetic Classification	(a) J. K. Maheshwari
(ii) Father of Taxonomy	(b) Linnaeus
(iii) Binomial Nomenclature	(c) George Bentham
(iv) The Families of Flowering Plants	(d) Adanson
(v) Flora of British India	(e) Engler & Prantl
(vi) *Die Naturlichen Pflanzenfamilien*	(f) Hutchinson
(vii) Father of Numerical Taxonomy	(g) First May 1753

2. (a) Discuss the principles of ICN. (5)

(b) What are the functions of a herbarium? (5)

(c) Identify the taxonomic rank of the following: (5)

Parietales, *Solanum*, Magnoliophyta, Liliopsida, Rosaceae

3. (a) Discuss the role of palynology in relation to taxonohy. (5)

(b) Briefly discuss the differences between the phenograms and cladograms. (5)

(c) Mention the alternate names used for the following families: (5)

Compositae, Cruciferae, Graminae, Umbelliferae, Leguminosae

4. (a) Discuss merits and demerits of Engler and Prantl's system of classification. (8)

(b) Expand any three of the following: (3)

OTU, APG, DC, *nom.nud.*

(c) Interpret the following: (4)

(i) *Stellaria media* (L.) Will.

(ii) *Delphinium viscosum* Hook. f. *et* Thompson

(iii) *Cerasus cornuta* Wall. *ex* Royale.

(iv) *Carex kashmirensis* Clarke *in* Hook. f.

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1892 **GC-4**

Unique Paper Code : 42231202

Name of the Paper : Comparative Anatomy and Developmental Biology of Vertebrates

Name of the Course : **B.Sc. (Prog.)**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates:

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **Question No. 1** is compulsory.
3. There are two sections, **Section A** and **Section B**. Attempt **two** question from each section.
4. Attempt **five** questions in All.
5. Draw neat labelled diagrams wherever necessary.

1. (a) Define the following terms **(any four)**

   (i) Sebacous gland

   (ii) Cleavage

(iii) Induction

(iv) Crop

(v) Archinephric duct (1×4)

(b) Differentiate between the following terms (**any five**):

(i) Apocrine gland and Holocrine gland.

(ii) Physostomous swim bladder and Physoclistous swim bladder.

(iii) Demibranch and Holobranch.

(iv) Morula and Blastula.

(v) Animalpole and Vegetal pole.

(vi) Deciduous placenta and Non-deciduous placenta (2×5)

(c) Name the germ layers from which the following are derived:

(i) Spinal cord

(ii) Kidney

(iii) Lung

(iv) Bone (0.5×4)

(d) Fill in the blanks;

(i) Left systemic arch is present in _____.

(ii) _____ is the only gland present in birds.

(iii) The stretching and spreading of ectodermal cells during gastrulation is called _____.

(iv) Yolk synthesis in egg during Oogenesis is known as _____.

(v) _____ are the receptors of touch. (1x5)

(e) Match the following

A	B
(i) Islet of Langerhans	(a) Claw
(ii) Unguis	(b) Pancreas
(iii) Corona radiata	(c) Cerebrum
(iv) Pallium	(d) Graafian follicle

(1×4)

(f) Mention one function of the following:

(i) Sertoli cells

(ii) Glomerulus (1×2)

Section A

2. (a) Give an account of evolution of heart in vertebrates with the help of suitable diagrams.

(b) How is single circuit circulation different from double circuit circulation? (9,3)

3. (a) Discuss the succession of kidneys in vertebrates.

   (b) Describe the structure of lung of birds. (8,4)

4. Write short notes on any **three** of the following

   (a) Visceral arches

   (b) Digestive glands

   (c) Chemoreceptors

   (d) Mammalian brain (4×3)

Section B

5. (a) What is Spermiogenesis? Explain it with the help of suitable diagram. (6)

   (b) Discuss the hormonal control of metamorphosis in frog. (6)

6. (a) Explain the process of fertilization in mammals. (6)

   (b) Discuss the mechanisms of block to polyspermy. (6)

7. Write short notes on any three of the following:

   (a) Fate maps

   (b) Vitellogenesis

   (c) Morphogenetic movements

   (d) Implantation in humans (4×3)

[This question paper contains 4 printed pages] (22) 30/5/17

Roll No. | | | | | | | | | | | | |

S. No. of Question Paper : 1894

Unique Paper Code : 42351201

Name of the Paper : Calculus and Geometry

Name of the Course : B.Sc. Mathematical Sciences/B.Sc. Physical Sciences

Semester : II

Duration : 3 Hours Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

All questions are compulsory.

Attempt any *two* parts from each question.

Marks of each part are indicated.

1. (*a*) Use $(\in, \delta)$ definition to show that : 6

$$\lim_{x \to 3} \frac{x^2 - 9}{x - 3} = 6.$$

(*b*) Define uniform continuity. Show that the function f defined by :

$$f(x) = \sqrt{x}, 1 \leq x \leq 3$$

is uniformly continuous. 6

(c) Let f be a function defined on R by setting :

$$f(x) = |x - 1| + |x + 1|$$

Show that f is not derivable at the points $x = 1$ and $x = -1$, and is derivable at every other point. 6

2. (a) Show that the function f defined on R by setting :

$$f(x) = \begin{cases} \dfrac{e^{1/x}}{1 + e^{1/x}}, & x \neq 0 \\ 0, & x = 0 \end{cases}$$

is discontinuous at $x = 0$. State the kind of discontinuity. 6

(b) State and prove Lagrange's Mean Value Theorem and give its geometrical interpretation. 6

(c) Find the area of the curve $r = 2a \cos \theta$. 6

3. (a) Find the asymptotes of the curve : 6

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

(b) Determine the position and nature of the double points of the following curve : 6

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

(c) Trace the following curve : 6

$$x = a \cos^3 \theta, \; y = a \sin^3 \theta.$$

4. (a) Evaluate the definite integral : 6½

$$\int_1^2 \frac{dx}{x^2\sqrt{x^2 - 1}}.$$

(b) Trace the curve : 6½

$$x^2(a^2 - x^2) = y^2(a^2 + x^2).$$

(c) If $I_n = \int_0^{\pi/4} \tan^n \theta$, show that : 6½

$$I_n + I_{n-2} = \frac{1}{n-1}$$

Deduce the value of I_5.

5. (a) Find the volume of the solid obtained by revolving the cardioid : 6

$r = a(1 - \cos \theta)$ about the initial line.

(b) Sketch the parabola $(x + 2)^2 = -(y + 2)$ and label its focus, vertex and directrix. 6

(c) Find the equation of the hyperbola with vertices $(0, \pm 8)$ and asymptotes $y = \pm \frac{4}{3}x$. 6

6. (*a*) Let an $x'y'$-coordinate system be obtained by rotating an xy-coordinate system through an angle of $\theta = 30°$. Find an equation of the curve $\sqrt{3}xy + y^2 = 6$ in $x'y'$-coordinates. 7

(*b*) (*i*) Find the centre and radius of the following sphere : 4

$$x^2 + y^2 + z^2 + 6x - 8y + 10z - 14 = 0.$$

(*ii*) Find :

$$\nabla \times (\nabla \times \vec{F})$$

where :

$$\vec{F} = y^2x\hat{i} - 3yz\hat{j} + xy\hat{k}.$$ 3

(*c*) (*i*) Prove that div(curl F) = 0, where F = F(x, y, z) is a vector field. 4

(*ii*) Prove that curl(grad ϕ) = 0, where $\phi = \phi(x, y, z)$ is a scaler field. 3

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1896 GC-4

Unique Paper Code : 42171205

Name of the Paper : Chemistry (Chemical Energetics, Equilibria and Functional Organic Chemistry – I)

Name of the Course : **B.Sc. Programme**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Use of Scientific calculators and log tables is allowed.
3. Use separate sheets for **Section A** and **Section B.**

SECTION A
(PHYSICAL CHEMISTRY)

Attempt any **three** *questions in this section.*
All *questions carry equal marks.*

1. (a) Define the following :

(i) Integral enthalpy of dilution

P.T.O.

(ii) Differential enthalpy of solution

(b) (i) In a calorimeter, NH_2CN (Cyanamide) was subjected to combustion at constant volume and the heat evolved (q_v or ΔE) was found to be 742.7 kJ at 25°C. Calculate ΔH or q_p for the reaction.

(ii) The $\Delta_f H°$ of CO_2 (g), CO (g), H_2O (l) are –393.5, –110.5, –241.8 kJ/mol respectively. What would be the standard enthalpy change (in kJ mol^{-1}) for the reaction ?

$$CO_2\,(g) + H_2\,(g) \text{ -------> } CO\,(g) + H_2O\,(l)$$

(c) Derive the Kirchhoff' s equation to explain the variation of enthalpy of a reaction with temperature. (4,4,4.5)

2. (a) Find out the relationship between Kp, Kx, and Kc. What is the condition for following relation to be valid

$$K_p = K_x = K_c$$

(b) Calculate the equilibrium constant for the given reaction if 5 moles of A_2, 3 moles of B_2 and 2 moles of AB_2 are present at equilibrium at 8.21 atm and 300K

$$A_2\,(g) + 2B_2\,(g) = 2AB_2\,(g) + \text{heat}$$

(c) State the Le Chatelier's principle. Explain how Le Chatelier's principle helps in understanding the effect of change of concentration, pressure and temperature on chemical equilibrium. (4,4,4.5)

3. (a) What are buffer solutions ? Explain the mechanism of buffer action in a solution prepared by mixing equimolar solutions of acetic acid and sodium acetate.

(b) The solubility product of $Pb_3(PO_4)_2$ is 1.5×10^{-32}. Determine its solubility in g/litre. Molar mass of $Pb_3(PO_4)_2$ = 811g.

(c) Explain the following :

(i) pH Scale

(ii) Common ion effect

(iii) Third Law of thermodynamics (4,4,4.5)

4. (a) Why is the standard enthalpy of neutralization of one mole of a strong acid with one mole of a strong base a constant i.e. –57.3 kJ/mol ? Explain giving reasons what will happen to the enthalpy change whether it will increase, decrease or remain same compared to the above case if :

(i) 100 mL of 1M strong acid and 100 mL of 2 M strong base are mixed.

(ii) 100 mL of 1M weak acid and 100 mL of 2 M strong base are mixed.

(b) Derive the relationship between degree of ionization and ionization constant. Explain at least two factors affecting degree of ionization.

(c) (i) Why salts of strong acids and strong bases do not undergo hydrolysis ?

(ii) Calculate the degree of hydrolysis of a 0.10 M solution of sodium acetate at 25°C.

$K_a = 1.75 \times 10^{-5}$ $K_w = 1.008 \times 10^{-14}$.

(4,4,4.5)

SECTION B
(ORGANIC CHEMISTRY)

Attempt any **three** *questions.*
All *questions carry equal marks.*

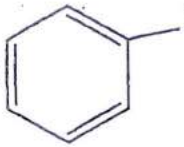
5. (a) Draw the contributing resonance structures for the arenium ion produced when chloronium ion (generated by $Cl_2/FeCl_3$) reacts with Benzene ?

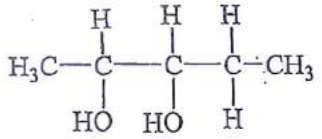
(b) Give the reason why phenol cannot be nitrated by $HNO_3 + H_2SO_4$ mixture directly. How p-Nitrophenol can be prepared starting from phenol ?

(c) Predict the reaction mechanism followed for nucleophilic substitution reaction when a primary alkyl halide reacts with aq. sodium hydroxide. Give the reaction mechanism. Predict the stereochemistry of the product with respect to starting halide. (4,4,4.5)

6. (a) Complete the following reactions :

(i)  + $CH_3CH_2CH_2Cl \xrightarrow[\Delta]{AlCl_3}$?

(ii)  $\xrightarrow[\Delta]{CuCl / HCl}$?

(iii)  $\xrightarrow{HIO_4}$? + ?

(iv) CH_3CHO + EtMgI ⟶ ? $\xrightarrow{H_3O^+}$?

(b) Give the reactions and structure of the products when acetaldehyde is reacted with

(i) NH_2OH

(ii) C_2H_5OH

(c) Give the Benzyne mechanism for reaction of C-14 labelled Chlorobenzene with $NaNH_2$. (4,4,4.5)

7. (a) Which compounds give Iodoform test ? Give the mechanism of the reaction ?

(b) Explain why Williamson's synthesis of t-Butyl ethyl ether using t-Butyl bromide and sodium ethoxide is not a good synthesis ?

(c) Give steps involved in the formation of phenol from Benzene by cumene hydroperoxide method ?

(4,4,4.5)

8. Write short notes on any **three** of the following :

(i) Reimmer-Tiemann reaction

(ii) Pinacol-Pinacolone rearrangement

(iii) Cannizzaro reaction

(iv) Benzoin condensation (4,4,4.5)

This question paper contains 4 printed pages.

Sl. No. of Ques. Paper : **42** G

Unique Paper Code : **234261**

Name of Paper : **Data Structure (Computer Sc. – II)**

Name of Course : **B.Sc. (Prog.) Physical / Mathematical Sciences**

Semester : **II**

Duration : **3 hours** *Maximum Marks* : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Section A is compulsory.
Attempt any five questions from Section B.

SECTION A

1. (a) Write full form of FIFO and LIFO. Which method does stack use— FIFO or LIFO? 2

   (b) Evaluate the following postfix expression. Assume A=1, B=2, C=3.

   ABC+*CBA−+* 2

   (c) In worst case which search is better, linear search or binary search and why? 2

   (d) Write class definition for a node of doubly linked list in C++. 2

   (e) List two main differences between singly and doubly linked list. 2

   (f) If a binary tree contains *m* nodes at level L, how many nodes does it contain, at most, at level L+1? 2

P. T. O.

(g) Define the following:—

(i) Depth of Binary tree

(ii) Binary search tree

(iii) Strictly Binary tree

(iv) Height of Binary tree. 4

(h) Write a recursive function to traverse a binary search tree in preorder. 4

(i) Differentiate between the following:—

(i) Linear Search and Binary Search

(ii) Stack and Queue. 5

SECTION B

Attempt any five questions.

2. (a) Convert the following infix expression into postfix form showing intermediate status of the stack after every step in tabular form:—

(A+B)*(C/(D−E)+F)−G 5

(b) List advantages and disadvantages of linked list implementation of stack over array implementation. 4

(c) Name the data structure used for the implementation of recursion. 1

3. (a) Write a function that uses stack to find whether a string is a palindrome or not. (For example, MADAM is palindrome, ANT is not a palindrome.) 5

(b) Give the linked list implementation of a queue. Write the function to delete an element from the queue. 5

4. (a) Write a function in C++ to count the number of elements in a linked list. 5

(b) Use array implementation to write the push() and pop() function of Stack. 5

5. (a) Define the following terms:—

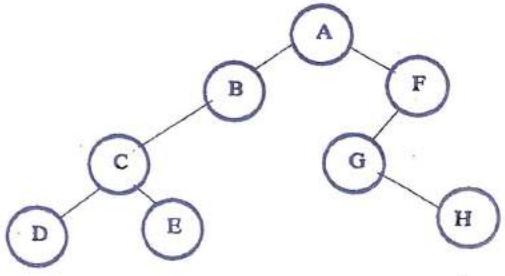
(i) Circular Queue

(ii) Dequeue (Double Ended Queue)

(iii) Linked List. 3

(b) If a binary tree contains *m* nodes at level L, how many nodes does it contain, at most, at level L+1? 2

(c) Perform the Preorder and Postorder traversal of the following binary tree. 5



6. (a) What are the conditions used to determine the overflow and underflow of a queue? How are these conditions handled in case of circular queue? 5

(b) List various ways of implementing priority queues using array implementation.

Write the linked list implementation of priority queue. 5

7. (a) Show the sequence of steps involved in sorting the elements using Insertion sort. The list of elements is as follows:—

7, 12, 3, 2, 4, 9 5

(b) Create a binary search tree using the following values:—

15, 3, 22, 5, 4, 34, 7, 2, 8

Show all the intermediate trees. 5

8. (a) Write a function in C++ for bubble sort.

5 (b) Write a function in C++ for binary search using recursion. 5

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 43 G

Unique Paper Code : 235266

Name of the Paper : Calculus and Geometry (MAPT-202)

Name of the Course : **B.Sc. (Hons.) Computer Science I/B.Sc. Mathematical Sciences/ B.Sc. Physical Sciences I**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates:

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **All** the questions are compulsory.
3. Attempt any **two** parts from each question.
4. Marks of each part are indicated.

1. (a) Use (ε, δ) definition to prove that $\lim_{x\to 3}(x^2-8)=1$. (6)

   (b) Show that $f(x) = |x|+|x-1|$ is continuous but not derivable at x= 0 and x = 1. (6)

P.T.O.

(c) State Rolle's theorem and discuss the applicability to $f(x) = x^3 - 4x$ in $[-2, 2]$. (6)

2. (a) Find the asymptotes of the curve $x(x^2 + y^2) = a(x^2 - y^2)$. (6)

(b) Let f be defined on an interval I. If f be derivable at a point $x_0 \in I$, then prove that it is continuous at x_0. (6)

(c) Define uniform continuity of a function and show that the function defined by $f(x) = x^2$, $x \in [-1, 1]$ is uniformly continuous. (6)

3. (a) Find the intervals for which the function $y = 2x^4 - 3x^2 + 2x + 1$ is convex or concave and determine its points of inflexion. (7)

(b) Find the multiple points on the curve $x^4 + y^4 - 2x^2 - 2y^2 + 1 = 0$. Also, find the nature of each multiple point. (7)

(c) Trace the curve $r = a(1 + \cos\theta)$. (7)

4. (a) Trace the curve $y^2(a^2 + x^2) = x^2(a^2 - x^2)$. (6)

(b) If $I_n = \int_0^{\pi/4} tan^n x\, dx$, show that for $n > 1$, $I_n + I_{n-2} = \frac{1}{n-1}$. Deduce the value of I_5. (6)

(c) Draw a rough sketch of the cycloid $x = a(\theta - sin\theta)$, $y = a(1 - cos\theta)$, $0 \le 0 \le 2\pi$. Also find the length of the arc of the cycloid. (6)

5. (a) Find the area of the loop of the curve $y^2(a + x) = x^2(3a - x)$. (6)

(b) Describe the graph of the equation

$y^2 - 8x - 6y - 23 = 0$. (6)

(c) Find the equation of the hyperbola with vertices $(\pm 2, 0)$, foci $(\pm 3, 0)$. Describe its reflection property with graph. (6)

6. (a) Rotate the axes of coordinates to get rid of the xy-term from the equation $x^2 - xy + y^2 - 2 = 0$. Identify the conic and sketch its graph. (6.5)

(b) (i) For $\varphi = \varphi(x, y, z)$, prove that

$curl(\nabla\varphi) = 0$ (3)

(ii) For radious vector $\vec{r} = x\,\hat{i} + y\,\hat{j} + z\,\hat{k}$, , prove that

$$\nabla\frac{1}{\|r\|} = -\frac{r}{\|r\|^3}.$$

(3.5)

(c) (i) Sketch the graph of $z^2 + x^2 = 1$, in 3-space and identify it. (3)

(ii) Using $\frac{d}{dt}[r_1(t).r_2(t)] = r_1(t).r_2'(t) + r_2(t).r_1'(t)$, for

$\overrightarrow{r_1(t)} = 2t\ \hat{\imath} + 3t^2\ \hat{\jmath} + t^3\ \hat{k}$ and $\overrightarrow{r_2(t)} = t^4\ \hat{k}$,

calculate $\frac{d}{dt}[r_1(t).r_2(t)]$ (3.5)

(96) 24/5/17

This question paper contains 4 printed pages.

Your Roll No. .....

Sl. No. of Ques. Paper : 107

Unique Paper Code : 234291

Name of Paper : **Computational Skills: (CSAT-201)**

Name of Course : **B.Sc. (Prog.) / B.Sc. (Hons.)**

Semester : **II**

Duration : : **3 hours**

Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Q. No. 1 is compulsory. Attempt any five questions out of the remaining questions.

1. Answer the following:

   (a) Give the full forms of FTP, WWW, PROM, URL, PDA and OCR. 3

   (b) Who is known as the Father of Computers? 1

   (c) Find the two's complement of $(10011101)_2$. 1

   (d) What is a browser? Give names of any *two*. 2

   (e) What is hypertext? 1

   (f) List any *two* applications of Generative Graphics. 2

   (g) List *two* applications of Internet. 2

P. T. O.

(h) What is a register? Name any *two*. 2

(i) Name the main hardware component used in first generation computers. 1

(j) What is 'stored program' concept? 1

(k) How is animation different from video? 2

(l) 1 MB = ... bytes 1

(m) What is cache memory? 2

(n) Add $(10011011)_2$ to $(01110110)_2$. 2

(o) What is the difference between download and upload? 2

2. Perform the following:

(a) $(1001101)_2 = (\quad)_{10}$

(b) $(AB.CD)_{16} = (\quad)_2$

(c) $(1001.01)_2 = (\quad)_8$

(d) $(142.07)_{10} = (\quad)_2$

(e) $(45.02)_8 = (\quad)_2$ 10

3. (a) Draw a block diagram to show the organisation of a computer system. 3

(b) Describe in brief the different components of a computer system. 4

(c) Differentiate between primary and secondary storage. 3

4. (a) Differentiate between impact and non-impact printers. Give an example of each. 5

(b) Explain the characteristics of fifth generation computers. 3

(c) List any *two* functions of operating system. 2

5. (a) What is electronic mail? Explain the various parts of an e-mail. 5

(b) What is internetworking? List *two* differences between bridge and gateway. 3

(c) What is LAN? Give its *two* advantages. 2

6. (a) What is the purpose of communication protocol? Name any *two* protocols. 4

(b) What is multimedia? Explain the components of multimedia. 6

7. (a) What is an algorithm? What are the various ways to represent it? 5

(b) Write an algorithm to read a number N and print its multiplication table from 1 to 10. 5

8. Write short notes on any *four*:

(a) Client Server Architecture

(b) Firewall

(c) Mainframe Computers

(d) Virtual Reality

(e) Newsgroups

(f) IT Act. 10

(87) 13/5/17

This question paper contains 3 printed pages.

Your Roll No. .....

Sl. No. of Ques. Paper : **108** **G**

Unique Paper Code : **222263**

Name of Paper : **Thermal Physics (PHPT-202)**

Name of Course : **B.Sc. (Prog.)**

Semester : **II**

Duration : : **3 hours**

Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Q. No. 1 is compulsory. Attempt five questions in all. All questions carry equal marks.

1. Attempt any *five* of the following:

   (a) Distinguish between reversible and irreversible processes.

   (b) Calculate the amount of work done in an isothermal process.

   (c) Calculate the wavelength at which the human body radiates maximum energy. Take body temperature as 37°C and Wien's constant $b = 2{\cdot}898 \times 10^{-3}$ mK.

   (d) Why is it not possible to obtain absolute zero? Explain.

   (e) State Carnot's theorem.

P. T. O.

(f) Write down the assumptions of kinetic theory of gases.

(g) What is the effect of temperature on coefficient of thermal conductivity of the gas? 3×5=15

2. (a) Define Carnot's cycle. Explain the working of a Carnot heat engine for a perfect gas and calculate its efficiency in terms of temperature. 10

(b) Efficiency of a Carnot cycle changes from 1/4 to 1/2 when source temperature is raised by 200 K. Calculate the temperature of the sink. 5

3. (a) Define entropy. Derive expression for change in entropy of a perfect gas in terms of:

(i) Temperature and volume

(ii) Temperature and pressure. 2,4,4

(b) Show that for an adiabatic process in a perfect gas PV^{γ}=constant. 5

4. (a) What are thermodynamic potentials? Derive Maxwell's thermodynamical relations using thermodynamic potentials. 10

(b) Prove that adiabatic elasticity of a gas is γ times the isothermal elasticity. 5

5. (a) Define Joule-Thomson's coefficient and derive its expression for (i) a perfect gas, (ii) a real gas. 10

(b) Derive Claussius-Clapeyron equation using Maxwell's thermodynamical relations. 5

6. (a) Derive Wien's displacement law and Stefan's law from Planck's radiation law. 10

(b) Explain the distribution of energy of a black body at different temperatures by drawing the graphs. 5

7. (a) What is transport phenomena in gases? Derive an expression for the coefficient of viscosity of a gas on the basis of kinetic theory of gases. 10

(b) Show that $K=\eta C_V$, where the symbols have their usual meanings. 5

8. (a) State the law of equipartition of energy. Show that C_P/C_V =1·67 for a monoatomic gas and 1·40 for a diatomic gas. 5

(b) Define mean free path of a gas molecule and derive an expression for the mean free path on the basis of kinetic theory of gases. 10

(78)

This question paper contains 4 printed pages.

Your Roll No. 13/5/17

Sl. No. of Ques. Paper : **109** **G**

Unique Paper Code : **235267**

Name of Paper : **Calculus & Matrices: MAPT-101**

Name of Course : **B.Sc. (Prog.)**

Semester : **II**

Duration : : **3 hours**

Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt two questions from each Section.
Use of scientific calculator is not permitted.

SECTION I

1. (a) Find inverse of the matrix:

$$A=\begin{bmatrix}1 & 1 & 1\\ 0 & 2 & 3\\ 5 & 5 & 1\end{bmatrix}$$

using elementary row operations.

(b) Let:

$$S=\left\{\begin{bmatrix}x\\ y\\ z\end{bmatrix} : x+y=z \text{ and } x,y,z\in R\right\}$$

Show that S is a subspace of R^3. 6,6

2. (a) Let $T : R^2 \to R^2$ be defined by:

$$T\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} -y \\ -x \end{bmatrix}.$$

Show that T is a linear transformation known as reflection with respect to the line $y=-x$. Also find the standard matrix representing T.

(b) Let:

$$A=\begin{bmatrix} 2 & 3 & 0 \\ 2 & 2 & 2 \\ 0 & 2 & 3 \end{bmatrix}.$$

Find the eigenvalues and the corresponding eigenvectors. 6,6

3. (a) Solve the system of equations:

$$x+y+z=6$$
$$2x+3y+4z=20$$
$$x+y=z$$

(b) Determine the rank of the matrix A:

$$A=\begin{bmatrix} 0 & 2 & 4 & 6 \\ 3 & -1 & 4 & -2 \\ 6 & -1 & 10 & -1 \end{bmatrix}.$$ 6,6

Section II

4. (a) Draw the graph of the functions:

(i) $f(x)=e^{|x|}$

(ii) $f(x)=e^{-x}+1$.

(b) Radium is known to decay at a rate proportional to the amount present. If half life of radium is 1600 years, what percentage of radium will remain in a given sample after 800 years?

(c) Draw the level curves of $z=x^2+y^2$ of height $k=1$, 2, 5 and 7. 6,6,6

5. (a) Verify that the function $z=e^x \sin y+e^y \cos x$ satisfies Laplace's equation.

(b) If $y=(\sin^{-1}x)^2$, prove that:

$$(1-x^2)\frac{d^2y}{dx^2}-x\frac{dy}{dx}-2=0.$$

Hence show that:

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

(c) Find the Taylor series generated by $f(x)=\sin x$ at $x=0$. 6,6,6

6. (a) Discuss the convergence of following sequences:

(i) $\left\{\frac{\cos n}{n}\right\}$

(ii) $\left\{\frac{n+1}{n}\right\}$

(b) If $u=f(r)$, where $r=\sqrt{x^2+y^2}$, prove that:

$$\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=f''(r)+\frac{1}{r}f'(r).$$

(c) Find $\frac{d^n y}{dx^n}$, where $y = e^{ax} \cos^2 x \sin x$.

6,6,6

SECTION III

7. (a) Find the centre and radius of the circle whose equation is $|z-i| = 3|z+i|$.

(b) Simplify:

$$\frac{(\cos\alpha + i\sin\alpha)^4}{(\sin\beta + i\cos\beta)^5}$$

3·5,4

8. (a) Let z_1, z_2, z_3 be the suffixes of the points P, Q and R respectively. If $|z_1| = |z_2| = |z_3|$ and $z_1 + z_2 + z_3 = 0$, prove that the triangle PQR is equilateral.

(b) Using De Moivre's theorem, solve the equation:

$$z^7 + z = 0.$$

3·5,4

9. (a) Form an equation in lowest degree with real coefficients which has $2-3i$, $3+2i$ as two of its roots.

(b) Write down all the values of $(\sqrt{3}+i)^{1/3}$.

3·5,4

[This question paper contains 4 printed pages.]

Your Roll No. .....

Sr. No. of Question Paper : 112 G

Unique Paper Code : 217263

Name of the Paper : Industrial Chemistry – II

Name of the Course : **B.Sc. (Prog.)**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **six** questions in all.
3. Question No. **1** is compulsory.

1. (i) What are petrochemicals ? Give its uses.

   (ii) What are Surfactants ? Give its classification.

   (iii) What is meant by calorific value of a fuel ? How is it determined ?

P.T.O.

(iv) Define acid value. Give its significance.

(v) Write a note on solid lubricants. (3×5=15)

2. Write short note on the following :

(i) Producer gas

(ii) Coal gasification

(iii) Coal tar distillation

(iv) Requisites of a good metallurgical coke (3×4=12)

3. (i) Define cloud point and pore point.

(ii) Write a note on lubricating oils.

(iii) Write a short note on synthetic lubricants.

(iv) What is Viscosity Index of a lubricant ? Discuss its importance. (3×4=12)

4. Write short note on the following :

(i) Bio gas

(ii) CNG

(iii) Synthetic fuels

(iv) LPG (3×4=12)

5. (i) Discuss cationic surfactants.

(ii) Discuss the cleansing action of soap. Give the limitations of soap as cleansing agent over detergent.

(iii) Write a short on additives used in manufacturing of soap.

(iv) What are the advantages of synthetic detergents ? (3×4=12)

6. (i) What are binders ?

(ii) Write a short note on hydrogenation of oil.

(iii) Write a short note on production of water gas.

(iv) Give the preparation of isoprene and its uses. (3×4=12)

7. (i) Discuss carbonization of coal.

(ii) Write a note on production of butadiene.

(iii) Describe the industrial production of toluene. Give its uses.

(iv) Write a note on Artificial Sweetners. (3×4=12)

8. (i) What are the disadvantages of phosphate builders ? Name some alternatives for Phosphate builders.

(ii) Write a note on preservatives.

(iii) Write a note on food colours.

(iv) Give composition of crude petroleum. (3×4=12)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 116 **G**

Unique Paper Code : 218281

Name of the Paper : ESQP ENVIRONMENTAL STUDIES

Name of the Course : **B.Sc. (Hons.)/B.Sc. (Prog.)**

Semester : II

Duration : 3 Hours Maximum Marks : 50

(Write your Roll No. on the top immediately on receipt of this question paper.)

(इस प्रश्न-पत्र के मिलते ही ऊपर दिए गए निर्धारित स्थान पर अपना अनुक्रमांक लिखिए।)

Note :– Answers may be written either in English or in Hindi; but the same medium should be used throughout the paper.

इस प्रश्न-पत्र का उत्तर अंग्रेज़ी या हिन्दी किसी एक भाषा में दीजिए; लेकिन सभी उत्तरों का माध्यम एक ही होना चाहिए।

Answer any FIVE questions.

All questions carry equal marks.

किन्हीं पाँच प्रश्नों के उत्तर दीजिए।

सभी प्रश्नों के अंक समान हैं।

P.T.O.

1. Define any **TEN** of the following:

(i) Water Shed

(ii) Bioremediation

(iii) E- waste

(iv) Lithosphere

(v) Soil

(vi) Communities

(vii) Desertification

(viii) Eutrophication

(ix) Carrying Capacity

(x) Nuclear winter

(xi) CFC

(xii) Ozone hole

(xiii) EPA

(xiv) Stratosphere (1×10=10)

निम्न में से किन्हीं **दस** की परिभाषा दीजिए:

(i) जलविभाजक (पनढाल)

(ii) जैवोपचारण

(iii) ई-कचरा

(iv) स्थल मंडल

(v) मृदा

(vi) समुदाय

(vii) मरुस्थलीकरण

(viii) सुपोषण

(ix) वहन क्षमता

(x) नाभिकीय शीत

(xi) सी एफ सी

(xii) ओजोन छिद्र

(xiii) ई पी ए

(xiv) समताप मंडल

2. Write short notes on any **four**:

(i) Ecological pyramids

(ii) Energy flow diagrams

(iii) Food web

(iv) Hydrological cycle

(v) Global warming and its effect on Biodiversity

(vi) Wind as an alternate source of energy. (4x21/2=10)

निम्न में से किन्हीं **चार** पर संक्षिप्त टिप्पणी लिखिए:

(i) पारितंत्रीय पिरामिड

(ii) ऊर्जा प्रवाह रेखाचित्र

(iii) खाद्य जाल

(iv) जल-चक्र

(v) विश्वव्यापी उष्णता और जैवविविधता पर इसका प्रभाव

(vi) ऊर्जा के एक वैकल्पिक स्रोत के रूप में पवन

3. What do you understand by sustainable development? How can this be achieved by our country. (10)

निर्वहनीय विकास से आप क्या समझते हैं? हमारा देश इसकी प्राप्ति किस प्रकार कर सकता है?

4. (a) How does increasing human population pose a threat to India's environment? (5)

(b) Discuss some of the reasons for recurring drought in India. (5)

(क) भारत के पर्यावरण के लिए मानव जनसंख्या में वृद्धि किस प्रकार संकट उत्पन्न करती है?

(ख) भारत में सूखे की पुनरावृत्ति के कुछ कारणों की विवेचना कीजिए।

5. (a) Taking any one example explain how any habitat can be successfully restored. (5)

(b) Enumerate some of the clean technologies that can be used by the industries. (5)

(क) कोई एक उदाहरण देकर स्पष्ट करें कि किसी आवास का सफलतापूर्वक पुनः स्थापन किस प्रकार से किया जा सकता है?

(ख) कुछ ऐसे स्वच्छ तकनीक का वर्णन करें जिनका उद्योगों द्वारा इस्तेमाल किया जा सकता है।

6. Our age old agricultural practices can no more be practiced. Why? Explain some of the newer methods of agriculture which should be adopted to protect the environment. (10)

हमारी सदियों पुरानी कृषि-प्रथाओं का अब पालन नही किया जा सकता है? क्यों? कृषि के कुछ नए उपायों की चर्चा कीजिए जिन्हें पर्यावरण की सुरक्षा के लिए अपनाया जाना चाहिए।

. Critically evaluate any **two** of the statements: (10)

(i) Aforestation programs undertaken by the Government do not yield the desired results.

(ii) A major threat to biodiversity is habitat loss.

(iii) Lack of awareness is a major challenge to environmental protection in India.

किन्हीं दो कथनों का आलोचनात्मक परिक्षण कीजिए:

(i) सरकार द्वारा अपनाए गए वनरोपण कार्यक्रम वांछित परिणाम नहीं देते हैं।

(ii) जैव-विविधता के लिए एक बड़ा संकट आवास क्षति है।

(iii) भारत में पर्यावरण संरक्षण के लिए जागरूकता की कमी एक प्रमुख चुनौती है।

8. Give **any two methods** each for the following:

(a) Create awareness regarding air pollution

(b) Spread awareness regarding personal hygiene.

(c) Protect wildlife from becoming extinct.

(d) Spread awareness to stop misuse of water.

(e) Recycling of domestic waste. (5×2=10)

निम्नलिखित में से प्रत्येक के संबंध में **कोई दो उपाय** बताएं:

(क) वायु प्रदुषण के संबंध में जागरूकता लाने के लिए

(ख) निज स्वास्थ्य के संबंध में जागरूकता फैलाने के लिए

(ग) वन्य जीवन को विलुप्त होने से बचाने के लिए

(घ) जल के गलत प्रयोग को रोकने के बारे में जागरूकता फैलाने के लिए

(ङ) घरेलू अपशेष के पुनः चक्रण के लिए

(100)