

- (b) Given the following : 1

$$R3 \leftarrow R1 + (R2)' + 1$$

Specify the output of this micro-operation.

- (c) List the instructions needed in the basic computer in order to set E flip-flop to 1. 2

- (d) Differentiate between a positive and a negative edge triggered flip-flop. 2

- (e) What is a Binary counter ? How many flip-flops will be required for an n-bit binary counter ? 2

- (f) Convert the following numbers with the indicated bases to decimal : 2

(i) $(12121)_3$

(ii) $(4310)_5$

- (g) Give the characteristic table of JK flip-flop. 2

- (h) Simplify the following expression using Boolean algebra (Show all the steps) : 2

$$(B.C' + A'.D) . (A.B' + C.D')$$

- (i) Differentiate between RAM and ROM. 2

- (j) Using zero address instructions, write a program to evaluate the following arithmetic statement : 3

$$X = (A + B) * (C + D)$$

- (k) What do you understand by DMA ? Explain the process of DMA transfer. 3

- (l) Explain why the following micro-operation cannot be executed during a single clock pulse : 3

$$DR \leftarrow DR + AC \text{ (AC does not change)}$$

Specify the sequence of micro-operations performed to execute it.

Section B

(Attempt any five questions)

2. (a) Simplify the Boolean function F together with don't care conditions d in the sum of products form : 6

$$F(w, x, y, z) = \Sigma (0, 1, 2, 3, 7, 8, 10)$$

$$d(w, x, y, z) = \Sigma (5, 6, 11, 15)$$

Implement F using minimal number of NAND gates.

- (b) The content of AC in the basic computer is hexadecimal A675 and the initial value of E is 1. Determine the contents of AC, E, PC, AR and IR in hexadecimal after the execution of the CMA instruction (7200). The initial value of PC is hexadecimal 072. 4
3. (a) Draw a block diagram to construct a 5-to-32 line decoder with four 3-to-8 line decoders and one 2-to-4 line decoder. 5
- (b) An instruction is stored at location 300 with address field at location 301. The address field has the value 400. A process register R1 contains the number 200. Evaluate the effective address if the addressing mode of the instruction is : 5
- Direct
 - Immediate
 - Relative
 - Register Indirect
 - Index with R1 as the index register.

4. (a) What is a half adder ? Give its function table. Design a 4-bit binary incrementer using half-adders. 6
- (b) Convert as directed : 4
- $(11000011.10101)_2 = (?)_{16}$
 - $(736)_8 = (?)_{10}$
5. (a) The contents of Register A and Register B are 11001100 and 00110011 respectively. List the contents of Register A if the following operations are carried out on contents of A using contents of B : 6
- Selective Complement
 - Masking
 - Selective Set.
- (b) Write the micro-operations performed to execute the following instructions : 4
- BSA
 - AND to AC.

6. (a) Explain the three different types of instruction formats.

Given the following instructions (in hexadecimal), identify

the category to which they belong : 5

(i) 7800

(ii) F800.

- (b) Perform the following arithmetic operation using signed 2's complement representation for negative numbers : 3

$$(-38)_{10} - (+85)_{10}$$

- (c) How many address lines and input-output data lines are needed for a memory unit of 16M words \times 32 bits per word ? 2

7. (a) What is a multiplexer ? Explain the working of 4-to-1 MUX with a suitable diagram. 5

- (b) Find the hexadecimal equivalent of $(189.75)_{10}$. 2

- (c) List the micro-operations performed during fetch & decode phase of an instruction. 3

8. (a) Differentiate between : 4

(i) Isolated I/O and memory mapped I/O

(ii) Synchronous and Asynchronous Data Transfer.

- (b) Design a combinatorial circuit with three inputs x, y, z and three outputs A, B, C. When the binary input is 0, 1, 2, or 3, the binary output is one greater than the input; otherwise the binary output is one less than the input. 6

This question paper contains 4 printed pages]

2019

Roll No.

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S. No. of Question Paper : 2297

(2)

Unique Paper Code : 42354401

Name of the Paper : Real Analysis

Name of the Course : B.Sc. Mathematical Science/
B.Sc. (Prog.)

Semester : IV

Duration : 3 Hours

Maximum Marks : 75

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

There are six questions in this question paper.

Attempt any two parts from each question.

1. (a) Suppose that S and T are sets such that $T \subseteq S$. Show that if S is a finite set, then T is also finite set.
- (b) If A_m is a countable set for each $m \in \mathbb{N}$, then show that the union $\bigcup_{m=1}^{\infty} A_m$ is countable.
- (c) Define supremum and infimum of a set. Prove that every non-empty set of real numbers which is bounded below has an infimum.

6,6

P.T.O.

2. (a) Show that the set of rational numbers is not order complete.
- (b) Define the limit of a sequence. Show that sequence $\langle r^n \rangle$ converges to 0 if $|r| < 1$.
- (c) Let $Y = \langle y_n \rangle$ be defined inductively by $y_1 = 1$, $y_{n+1} = (2y_n + 3)/4$ for $n \geq 1$. Show that $\lim Y = 3/2$. 6,6
3. (a) State and prove Bolzano-Weierstrass theorem.
- (b) Let $X = \langle x_n \rangle$ be defined by $x_1 = 1$, $x_2 = 2$, $x_n = \frac{x_{n-1} + x_{n-2}}{2}$, for $n > 2$. Show that the sequence $\langle x_n \rangle$ is convergent.
- (c) Investigate the convergence or divergence of the following sequences :

(i) $\frac{\sqrt{n}}{n^2 + 1}$,

(ii) $\frac{\sqrt{n^2 + 1}}{n}$.

6,6

4. (a) Define the convergence of a series. Show that the series $\sum_{n=1}^{\infty} n^p$ converges when $p > 1$.
- (b) Show that the series $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n+1}}$ is divergent.
- (c) State and prove D'Alembert's ratio test. 6,6
5. (a) Test for convergence and absolute convergence the series :

$$1 - \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{5}} - \frac{1}{\sqrt{7}} + \dots$$

- (b) State and prove M_n test for uniform convergence of sequence $\langle f_n \rangle$ of real valued functions defined on $[a, b]$.
- (c) Find the radius of convergence of the following power series :

(i) $\sum_{n=0}^{\infty} 2^{-n} x^{3n}$,

(ii) $\sum_{n=0}^{\infty} \frac{3^n}{n4^n} x^n$.

6,6

6. (a) Define Riemann integral of a function. If $f \in R[a, b]$, then show that the value of integral of f is uniquely determined.
- (b) Let $f(x) = 2$ if $0 \leq x < 1$ and $f(x) = 1$ if $1 \leq x \leq 2$. Show that $f \in R[0, 2]$ and evaluate its integral using the definition of Riemann integral.
- (c) If $f: [a, b] \rightarrow R$ is monotone on $[a, b]$, then show that $f \in R[a, b]$.

7.5,7.5

[This question paper contains 4 printed pages.]

2019

③

Your Roll No. 170195820
23

Sr. No. of Question Paper : 2347

Unique Paper Code : 42224412

Name of the Paper : Wave and Optics

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

Semester : IV

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 **Five** questions in all.
3. Question Number 1 is compulsory.

1. Attempt any **five** parts from the following :

(5×3=15)

(a) Two narrow parallel slits of 0.5×10^{-8} m apart are illuminated by a monochromatic light of wavelength 5890\AA . Calculate the width of the fringes which are obtained on a screen distant 0.5 m from the slit.

(b) Why are Newton's rings circular?

P.T.O.

(c) Why there is need of extended source in the interference by division of amplitude.

(d) Find the radius of first half period element on a zone plate behaving like a convex lens of focal length 50 cm. The wavelength of light is 5000\AA .

(e) What is the condition for absent spectra in a diffraction grating?

(f) What are sound waves? How can they be produced?

2. (a) What do you understand by Lissajous figure? A Particle is subjected to two perpendicular SHM's simultaneously

$$x = A_1 \cos(2\omega t + \alpha) \quad y = A_2 \cos(\omega t)$$

obtain Lissajous figure analytically and graphically if $\alpha = \Pi/2$ and Π .

(b) Define simple harmonic motion (SHM). Show that the differential equation of motion for SHM is linear and homogenous. Hence, prove that the principle of superposition hold for SHM. (9,6)

3. (a) What are beats? What is the necessary conditions to obtain them?

(b) Two vibrations along the same line are described by $x(1) = 0.05 \cos 8\pi t$, $x(2) = 0.03 \cos 10\pi t$, where x is in meters, t in seconds. Obtain the equation describing the resultant motion. Hence find the beat period. (5,10)

4. (a) Explain the formation of standing waves on a stretched String. Sketch first three harmonics.

(b) What are progressive waves? How they differ from standing waves. Derive an expression for displacement in the progressive wave in terms of wavelength and velocity. Prove

$$y(x, t+T) = y(x, t) \quad (5,10)$$

5. (a) In Fresnel's Biprism experiment with a source of light of wavelength 5890\AA , a thin mica sheet of refractive index 1.6 is placed normally in the path of one of the interfering beams and the central bright fringe is shifted to a position of third bright fringe from the centre. Calculate the thickness of the mica sheet.

(b) Derive the conditions of constructive and destructive interference for Young's double slit experiment. (10,5)

6. (a) Explain the determination of difference in wavelengths of two waves using Michelson's Interferometer. How Michelson's Interferometer can be used to measure the refractive index of a thin transparent sheet.
- (b) In an experiment for determining the refractive index of a gas using Michelson's interferometer a shift of 148 fringes is observed, when all the gas is removed from the tube. If wavelength of light used is 589.3 nm and length of the tube is 20 cm, calculate the refractive index of the gas.
- (10,5)
7. (a) Each slit of a double slit has a width of 0.15 mm and the distance between their centers is 0.75 mm. Find the missing orders in the diffraction pattern.
- (b) Derive an expression for intensity distribution for Fraunhofer diffraction due to double slit.
- (5,10)
8. (a) What is zone plate? Show that a zone plate has multiple foci. Compare the zone Plate with a convex lens.
- (b) What is polarization of light? Explain elliptical and circular polarization.
- (10,5)

[This question paper contains 4 printed pages.]

(4)

Your Roll No.....



Sr. No. of Question Paper : 2348

Unique Paper Code : 42234406

Name of the Paper : Genetics and Evolutionary
Biology

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

Semester : IV

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 & B on separate sheets.

SECTION A – GENETICS

Answer three questions in all.

Question No. 1 is compulsory.

1. (a) Distinguish between any **three** of the following :
(6)
 - (i) Autopolyploidy and allopolyploidy
 - (ii) Paracentric inversion and pericentric inversion

P.T.O.

(iii) Transition and transversion

(iv) Test cross and back cross

(b) Define any **five** of the following : (5)

(i) Frame shift mutations

(ii) Barr body

(iii) Allele

(iv) Epistasis

(v) Linkage

(vi) Aneuploidy

(c) Give a suitable example for the following : (3)

(i) A virus used for fusing somatic cells *in vitro*.

(ii) A syndrome in human due to monosomy.

(iii) A chemical mutagen.

2. (a) Explain any two non-allelic gene interactions that modify Mendelian dihybrid ratio. (6)

(b) Explain the inheritance of Kappa particles in *Paramecium*. (6)

3. (a) Discuss the method of somatic cell hybridization. How is it used for gene mapping? (8)

(b) Explain pleiotropy with suitable examples. (4)

4. Write short notes on any **three** of the following : (4+4+4)

(a) Multiple alleles

(b) Translocations

(c) Sex Determination in *Drosophila*

(d) Chromosomal theory of inheritance

SECTION B – EVOLUTIONARY BIOLOGY

Attempt three questions in all, including Question No. 1 which is compulsory.

1. (a) Define any **four** of the following : (4)

(i) Ring species

(ii) Neo-Darwinism

(iii) Body fossils

(iv) Divergent evolution

(v) Coacervate

(b) Differentiate between the following : (6)

(i) Peripatric speciation and parapatric speciation

(ii) Continuous variations and discontinuous variations

(iii) Centripetal selection and centrifugal selection

(c) Comment on the following statements : (3)

(i) The frequency of the sickle-cell allele is generally higher in areas endemic to malaria.

(ii) Fossil records support the theory of evolution.

2. (a) Describe the major postulates of Darwin's theory of evolution. (6)

(b) Give the salient features of theory of biochemical origin of life. (6)

3. Explain the various reproductive isolating mechanisms with suitable examples. (12)

4. Write short notes on any **three** of the following : (4+4+4)

(a) K-T mass extinction

(b) Macroevolution

(c) Industrial melanism

(d) Organic variations

[This question paper contains 6 printed pages.]

(5)

Your Roll No.



Sr. No. of Question Paper : 2349

Unique Paper Code : 42164401

Name of the Paper : Plant Physiology and Metabolism

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

Semester : IV

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. Attempts **Five** questions in all.
3. Question No. **1** is compulsory.
4. **All** questions carry equal marks.

1. (a) Attempt (**Any Five**) (5×1=5)

(i) A hormone that was named after a fungus.

(ii) An example each of asymbiotic and symbiotic N₂ fixing bacteria.

P.T.O.

- (iii) Name any two mineral ions that are required for photolysis of water.
- (iv) Name the most abundant enzyme protein found in green tissues.
- (v) Name the end product of glycolysis.
- (vi) Name the pigment that exhibits photoreversibility.
- (b) Define the following **(Any Five)** (5×1=5)
- (i) Chelating agent
- (ii) Plasmolysis
- (iii) Coenzyme
- (iv) Apical dominance
- (v) Vernalization
- (vi) Anaerobic respiration
- (c) Give one important contribution of the following **(Any Five)** (5×1=5)
- (i) Ernst Münch
- (ii) F.F. Blackman

- (iii) Robert Hill
- (iv) T. Engelmann
- (v) J.V. Sachs
- (vi) W.W. Garner and H. A. Allard
2. Differentiate between the following **(Any Five)** : (5×3=15)
- (a) Transpiration and Guttation
- (b) Nitrate reductase (NR) and nitrite reductase (NiR)
- (c) Macronutrient and Micronutrient
- (d) Reversible and irreversible enzyme inhibitors
- (e) SDP and LDP
- (f) Cyclic and Non-cyclic photophosphorylation
- (g) Active and passive absorption
3. Answer **(Any Three)** : (3×5=15)
- (a) What are the criteria for determining the essentiality of mineral elements in plants?

- (b) Explain lock and key model of enzyme action with suitable diagram. Discuss any two factors affecting enzyme activity.
- (c) Describe nodulation process in leguminous plants with suitable diagrams.
- (d) Give brief account on oxidative pentose phosphate pathway.
4. Brief account on the following (Any Five) : (5×3 =15)
- (a) Crown gall
- (b) Florigen concept
- (c) Hatch & Slack cycle
- (d) Ethylene as a hormone
- (e) Respiratory quotient (RQ)
- (f) Red drop effect
- (g) Abscisic acid
5. Attempt the following (Any Three) : (3×5=15)
- (i) Explain GA_3 induced α - amylase synthesis in aleurone layer of cereals giving suitable diagrams.

- (ii) Describe the widely accepted "Cohesion and tension" theory of ascent of sap in higher plants. What are the limitations of this theory?
- (iii) Justify that water potential is an indicator of plant health. Explain its various components and their significance.
- (iv) Describe the activity of RUBISCO under high O_2 concentration (Photorespiratory Glycolate pathway).
6. Attempt the following : (3×5=15)
- (a) Who proposed the Pressure Flow Model for translocation of photoassimilates via phloem? Explain this model with the help of flow diagram.
- (b) Give an account of physiological roles of Auxins or Cytokinins.
- (c) How are lipids converted into sugars during germination of seeds via Glyoxylate pathway?
7. (a) Explain oxidation of pyruvate in mitochondria? Work out how many ATP molecules are produced after oxidation of one molecule of pyruvate. (8)

2349

6

(b) Discuss Calvin cycle in detail mentioning enzymes involved in each step ?

(7)

[This question paper contains 4 printed pages.]

(6)

Your Roll No. 9019



Sr. No. of Question Paper : 2352

Unique Paper Code : 42174406

Name of the Paper : Industrial Chemistry – IV :
Pharmaceuticals, Fermentation,
Pesticides and Perfumes

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

Semester : IV

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) What are anti-convulsants? Explain the method of synthesis of any one anti-convulsant drug?

(b) What are the functions of a shampoo? Write some types of shampoo.

(c) Draw the structures of any three of the following :

(i) Dapsone

P.T.O.

- (ii) Citric Acid
(iii) Sulphacetamide
(iv) Civetone
- (d) Write the names of any **two** Indian and any **two** multi-national pharmaceutical companies.
- (e) Classify the pesticides depending on the mode of their poisoning action.
- (f) Is sandalwood oil, an essential oil? State the advantages of sandalwood oil.
- (g) Draw the structure of cephalosporin. Which strain is used for its production? (3×5=15)
2. (a) What are anti-anginal drugs? Write the structure and mode of action of any one such example.
- (b) Draw the structure and explain the method of synthesis and mode of action of Aspirin.
- (c) What are pro-drugs? Write any two examples along with their structures of pro-drugs of Acyclovir. (4×3=12)
3. (a) Explain the fermentation process for the synthesis of Penicillin.
- (b) Draw the structure of Glutamic Acid. Name the microbes that can cause its fermentation. Explain its manufacturing process.

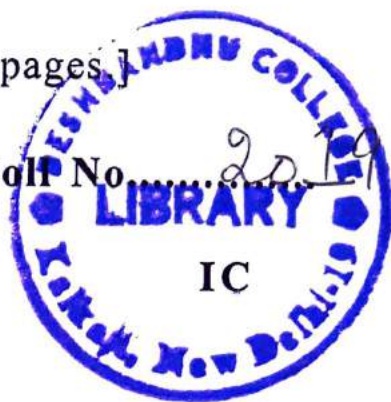
- (c) How is ethyl alcohol manufactured by fermentation? Write the applications of ethyl alcohol. (4×3=12)
4. (a) Explain the mechanism of mode of action of organophosphates.
- (b) To what category of compounds does Malathion belongs? Give its method of preparation.
- (c) Draw the structure of DDT. Why its use is now banned in many countries?
- (d) Write a note on Carbamates. (3×4=12)
5. (a) What is a hair dye? Write the characteristics of a good hair dye.
- (b) Mention and explain the ingredients of Talcum Powder.
- (c) What are the characteristics of a good lipstick? Give the names of some brands of lipstick available in India.
- (d) Write the applications of Muscone and draw its structure. (3×4=12)
6. (a) What are antibiotics? Write the method of synthesis of Chloramphenicol.

- (b) What are the applications of fermentation in daily life?
- (c) Give the advantages and disadvantages of pesticides. What do we mean by "Bio-Magnification" of pesticides? (4×3=12)
7. (a) What category of drugs does AZT-Zidovudine falls into? Write its structure and explain its mode of action.
- (b) Write a note of Chloromycetin.
- (c) What are the ingredients of Rose Oil? Mention the names of the methods of extraction of Rose Oil.
- (d) How is Vitamin B₁₂ (Cyanocobalamin) manufactured by fermentation process? (3×4=12)
8. (a) Explain the method for the synthesis of Vitamin C.
- (b) Write short notes on any **three** of the following :
- (i) Alachlor
 - (ii) Diazepam
 - (iii) Geraniol
 - (iv) Lysine
 - (v) Shaving Cream (3×4=12)

[This question paper contains 6 printed pages.]

(7)

Your Roll No. 2219



Sr. No. of Question Paper : 2354

Unique Paper Code : 42174404

Name of the Paper : Chemistry of S- & P- block
Elements, States of Matter
& Chemical Kinetics

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

Semester : IV

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 3 questions from **Section A** and 3 questions from **Section B**.
3. Please indicate the section you are attempting by putting a heading and do not intermix the sections.
4. The questions should be numbered in accordance to the number in the question paper.
5. Use of scientific calculator is permitted.
6. Graph paper may be provided.
7. Value of constant: $R = 8.314 \text{ JK}^{-1} \text{ Mol}^{-1}$

P.T.O.

Section A
(Inorganic Chemistry)

Attempt three questions in all.

1. Explain **any five** of the following :
- (i) The Hg – HgO line changes slope at 356°C in Ellingham diagram.
 - (ii) When heated, sulphur melts to a mobile liquid, but on further heating the viscosity increases sharply and then decreases again.
 - (iii) Despite having high ionization enthalpy, in aqueous solution Li is as good reducing agent as Cs.
 - (iv) The ionization enthalpies of group 13 elements are in the order of:
B > Al < Ga > In < Tl.
 - (v) Aluminium carbide is called methanide whereas calcium carbide is called acetylide.
 - (vi) Aluminium shows certain similarities with beryllium.
 - (vii) Oxygen differs from the rest of the elements of group 16. (5×2.5=12.5)
2. (a) Carbon monoxide is a better reducing agent for metal oxides than carbon below a temperature of 710°C but above this temperature reverse is true. Explain.

- (b) Arrange the following oxoacids of chlorine in order of increasing acidity :
HClO₄, HClO₃, HClO₂, HClO. Justify your answer.
- (c) Explain briefly the electronegativity in terms of Pauling's and Mullikan's scale.
- (d) Give an example of :
- (i) Oxoacid of phosphorous, where phosphorous exhibits: +1 oxidation state,
 - (ii) Hydride of nitrogen, where nitrogen exhibits: -1 oxidation state. (4,3.5,3,2)
3. (a) Discuss briefly the steps involved in Parke's process for recovering Ag and Au from Pb.
- (b) Taking diborane as a representative example, explain what is meant by a three centre – two – electron bond.
- (c) Identify the example, which best suits the property mentioned, giving reasons for your choice :
- (i) Stronger base: NH₃ or N₂H₄.
 - (ii) Stronger oxidizing agent: PbCl₂ or PbCl₄.
- (d) What happens when H₃PO₄ is heated?
(3,4,4,1.5)
4. (a) Draw the structure of the following :
- (i) Peroxodisulphuric acid

- (ii) Sulphuryl chloride
 (iii) Perchloric acid.
- (b) Write a short note on – “Allotropes of carbon.”
- (c) What happens when PCl_3 and PCl_5 react with water.
- (d) Name the specific reduction method used to obtain the following metals from their ores :
- (i) Sodium
 (ii) Manganese
 (iii) Iron
 (iv) Silver (3,3.5,4,2)

Section B

(Physical Chemistry)

Attempt three questions in all.

5. (a) Explain briefly the following :
- (i) A gas with van der Waals constant $a = 0$ cannot be liquefied.
- (ii) The ideal gas equation of state is not valid for a real gas.
- (iii) The compressibility factor, Z , for a real gas has a value different from unity.

- (iv) As the pressure of the gas decreases the mean free path of the molecules of the gas increases but the collision frequency decreases.
- (v) Viscosity of a gas increases with an increase in temperature but for a liquid usually the reverse is true.
- (b) State the law of corresponding states and derive the mathematical expression for the same.
 (2,2,2,2,2,2.5)
6. (a) Derive the expressions for the van der Waals constants a and b in terms of critical temperature, T_c and critical pressure P_c only.
- (b) Determine the interplanar spacing between the (2 2 1) planes of a cubic lattice of length 450 pm.
- (c) Benzene takes 46s to flow through an Ostwald's viscometer while water takes 68s at the same temperature. If the densities are 0.8 g mL^{-1} and 0.998 g mL^{-1} respectively and the coefficient of viscosity of water is $1.008 \times 10^{-3} \text{ Pa s}$, calculate the coefficient of viscosity of benzene.
 (4.5,4,4)
7. (a) Calculate the critical temperature of a van der Waals gas for which P_c is 100 atm and b is $50 \text{ cm}^3 \text{ mol}^{-1}$.

- (b) A reaction has the experimental rate equation $\text{Rate} = k[\text{A}][\text{B}]$. If the concentration of A is doubled, and the concentration of B is halved, what happens to the reaction rate?
- (c) Derive the Integrated Arrhenius equation for showing effect of temperature on reaction rate.
- (d) Addition of sodium nitrate increases the surface tension of water while the addition of detergent decreases it. Explain. (4,3,3,2.5)
8. (a) The decomposition of N_2O_5 is an important process in tropospheric chemistry. The half-life for the first-order decomposition of this compound is 2.05×10^4 s. How long will it take for a sample of N_2O_5 to decay to 60% of its initial value?
- (b) The distance between two consecutive (110) planes of a crystal is 1.678×10^{-10} m. What will be the glancing angle for an X-ray of wavelength 0.65×10^{-10} m incident on the plane for first order reflection?
- (c) Write a short note on Law of constancy of interfacial angle.
- (d) Derive the expression for the collision frequency, Z_{11} , for a gas. (4,4,2,2.5)

(8)

Set A

(This question paper contains 4 printed pages)

Sr. No. of Question paper : 3491

Roll No.....2019.....

Unique Paper Code : 107455

Name of the course : B.Sc. (Prog.) / B.Sc. (Hons) Life Sciences - LSPT 409

Name of the Paper : Bioinformatics

Semester : IV

Duration : 3 Hr

Maximum marks : 75



I

Instructions for the students:

(Write your roll no. on the top immediately on receipt of this question paper)

This paper contains Section A and B, attempt them separately.

Attempt three questions in all from each section.

Question no. 1 is compulsory in both sections

Section A

Q1. (a) Define: (any five)

.1x5=5

- (i) Refseq
- (ii) Unigene
- (iii) Swissprot
- (iv) Webin
- (v) Entrez
- (vi) Orthologous sequences
- (vii) Spidey
- (viii) EMBL Bank

(b) Expand the following: (any five)

½x5=2½

- (i) OMIM
- (ii) CDFD
- (iii) DDBJ
- (iv) MMDB

- (v) HTC
- (vi) GEO
- (vii) SNP
- (viii) PDB

(c) Give an example of: (any four)

$\frac{1}{2} \times 4 = 2$

- (i) Pathway database
- (ii) Genome database
- (iii) Microarray database
- (iv) Structure database
- (v) Chemical database
- (vi) Disease database

(d) Differentiate between (any two)

$2 \times 2 = 4$

- (i) Sequin and Bankit
- (ii) Primary and Composite database
- (iii) GenBank and PIR

(e). Write short notes (any three)

$3 \times 4 = 12$

- (i) ORF-finder
- (ii) SRS
- (iii) Curated database
- (iv) Literature database

Q2. (a) What is NCBI? Describe the role of NCBI. Discuss various resources available at NCBI.

(b) Briefly describe aims of bioinformatics.

9, 3

Q3. (a) What is BLAST? Describe different types of BLAST.

b) Describe briefly the tools of DDBJ.

8, 4

Q4. (a) Discuss in detail various databases and tools available at EMBL.

(b) What are biological databases? Discuss its important features.

9, 3

Section B

Q1. a) Define the following:

1 x 5=5

- (i) Monophyletic clade
- (ii) OTU
- (iii) *E*-Value
- (iv) Sister taxa
- (v) Consensus sequence

b) Difference between the following (any three):

2 x 3=6

- (i) Rooted and unrooted tree
- (ii) Local and global alignment
- (iii) Linear and Affine gap penalty
- (iv) Nodes and internodes

c) Expand the following

$\frac{1}{2} \times 5 = 2\frac{1}{2}$

- (i) GEO
- (ii) QSAR
- (iii) CADD
- (iv) ORF
- (v) SAGE

Q2. a) What is the principle of PAM matrix?

b) Add a note on advantages and disadvantages of PAM matrix in sequence alignment.

c) Compare PAM 40 and PAM 250 matrix in sequence alignment?

4, 5, 3

Q3. a) Briefly describe the phylogenetic tree? What are the properties of the phylogenetic tree?

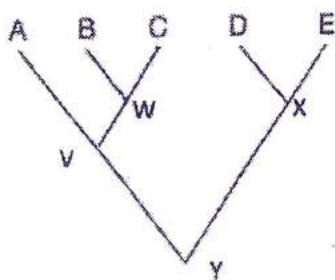
b) Maximum Parsimony method of tree construction is different from Maximum likelihood methods of tree construction, justify.

c) Look at the tree and answer the following questions

- i. Which taxa forms monophyletic clade?
- ii. What are the most recent common ancestors of taxa A, B and C?

iii. Give the number of monophyletic clades present here?

4, 5, 3



Q4. a) What is significance of lead molecule in drug discovery? Describe various steps to proceed with lead molecule to a potential drug molecule.

b) Bioinformatics has accelerated the process of drug designing. Justify the statement. 8, 4

Q5. Write short notes on any **three** of the following:

3 x 4=12

- (i) Molecular Clocks
- (ii) Pair-wise sequence alignment
- (iii) Applications of bioinformatics
- (iv) Software of phylogenetic analysis

SET-A

9

(This question paper contains 02 printed pages)

Sr. No. of Question paper : 3493



Roll No. 2019

Unique paper Code: 223451

Name of the Course: B.Sc. (Prog.) Life Science

Name of the paper: Molecular Biology (LSPT-407)

Semester: IV

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 including Question no.1, which is compulsory.
3. Please attempt various parts of a question at one place only.
4. Draw well labelled diagrams wherever necessary.

Q1 (A) Define the following:

- (1) Exon
- (2) Wobble hypothesis
- (3) Okazaki Fragments
- (4) Proto-oncogenes
- (5) Junk DNA

(5)

(B) Differentiate between the following:

- (1) DNA Polymerase I and DNA Polymerase III
- (2) Activator and Repressor gene
- (3) Left handed and Right handed helix
- (4) P-site and A-site
- (5) Missense and Nonsense Mutation

(10)

(C) Mention the function of the following:

(5)

- (1) DNA Ligase
- (2) Telomerase
- (3) Promoter
- (4) Sigma factor
- (5) IF₃

(D) Mention the contributions of the following:

(5)

- (1) Fraenkel-Conrat
- (2) Chargaff
- (3) Temin
- (4) Watson and Crick
- (5) Jacob and Monod

(E) Give the sequence of the following:

(2)

- (1) Pribnow Box
- (2) Initiation Codon

Q 2 (a) Explain the process of transcription in prokaryotes.

(6)

(b) Give the salient features of the Genetic code.

(6)

Q 3 (a) Describe the various enzymes involved in DNA replication.

(6)

(b) Describe the structure of tRNA and mention the unusual bases present in it.

(6)

Q 4 (a) Describe the organization and regulation of tryptophan operon in prokaryotes.

(8)

(b) What is a cell free system? Describe the experiment of Nirenberg in deciphering the genetic code.

(4)

Q 5 (a) Give a detailed account of structure of DNA as proposed by Watson and Crick.

(8)

(b) Explain with illustrations the intrinsic pathway involved in apoptosis.

(4)

Q 6 Write short notes on any *three* of the following

(4x3=12)

- (1) Semiconservative Replication
- (2) Telomere Shortening
- (3) Cell cycle Checkpoints
- (4) Chemicals as Carcinogens

Sl. No. 9 Q.P: 3494

2019
101

Unique Paper Code : 222463

10

Name of the Paper : Physics -IV: Electricity, Magnetism and Electromagnetic Theory (PHPT-404)

Name of the Course : B.Sc. (Physical Science)

Semester : IV

Duration : 3 Hours

Maximum Marks : 75



I

Instructions for Candidates

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

Attempt **Five** questions in all

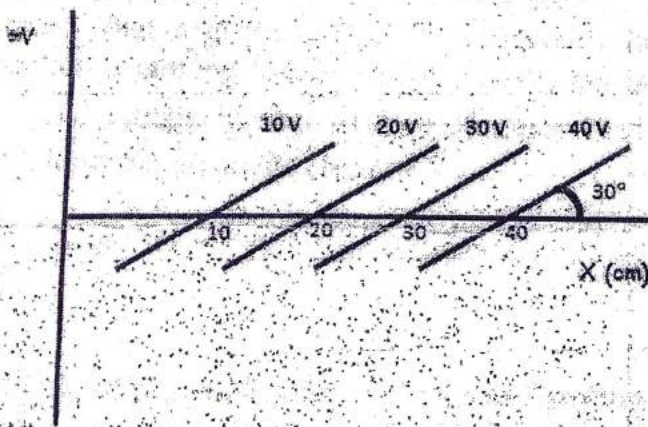
(Question No. 1 is compulsory. Attempt four questions from the rest of the paper)

Note : Use of non-programmable scientific calculator is allowed.

Q1. Attempt any **five** of the following

[5 × 3 = 15]

- If a charged particle is placed at rest in an electric field, will its path be along the line of force? Specifically discuss the case when the lines of force are (i) straight (ii) curved.
- Electric field in a region is given by $\vec{E} = (2\hat{i} + 3\hat{j} - 4\hat{k})$ V/m. Find the potential difference between points (0,0,0) and (1,2,3).
- Some equipotential surfaces are as shown. What is the magnitude and direction (w.r.t. x axis) of the electric field?



- Show that equation of continuity is a consequence of Maxwell's equation.
- What is the difference between circular and elliptical polarisation?
- Calculate the electric potential on the surface of a gold nucleus ($Z = 79$) of radius 6.6×10^{-15} metre.
- What is the physical meaning of the equation $\vec{\nabla} \cdot \vec{B} = 0$.
- Explain the terms of electromotive force (emf) and magnetomotive force (mmf) drawing an analogy between electric and magnetic circuits.
- What are the advantages of a Ballistic Galvanometer over a dead-beat moving coil galvanometer?

Q2 (a) Derive Gauss's Law in differential as well as integral form.

(b) Find the electric field inside and outside a spherical shell using Gauss's law.

(c) Two large metal plates of area 1.0 m^2 facing each other are separated by 5 cm and carry equal and opposite charges on their inner surfaces. If \vec{E} between the plates is 55 N/C , find the charge on the plates.

~~(8)~~
~~(7)~~

[4]

Q3

(a) A sphere of radius R carries a total charge Q uniformly distributed. Write the electric field at a point P (distant r from its center) lying inside and outside this sphere. Use these values to calculate the electric potential at P when it is inside and outside this sphere.

(b) Show that in free space, the energy density associated with an electric field is given by $U_E = \frac{1}{2} \epsilon_0 E^2$ where ϵ_0 is the permittivity of free space.

(c) Potential due to a point charge q at a distance r is given by $V = \frac{1}{4\pi\epsilon_0} \frac{q}{r}$, calculate the corresponding electric field $\vec{E}(r)$.

~~(10)~~

[4]

~~(5)~~

Q4

(a) Using the Biot Savart Law, find the force per unit length between two long parallel wires carrying current in the same direction separated by distance 'a' and hence show that parallel currents attract.

(b) A circular loop of radius $r = 2 \text{ cm}$ carries a steady current, $I = 16 \text{ A}$ in anti-clockwise direction. What magnetic field will be observed at the center of this loop.

(c) An electron is moving with a velocity $2\hat{i} + 5\hat{j} \text{ m/s}$ in an electric field of intensity $3\hat{i} + 6\hat{j} + 2\hat{k}$ and a magnetic field of $2\hat{j} + 3\hat{k} \text{ Tesla}$. Find the magnitude and direction of the Lorentz force acting on the electron.

[7]

[4]

[4]

Q5

(a) Derive the differential form of Amperes Circuital Law by proving the generality of $\text{curl } \vec{B}$.

(b) The magnetic field in a region is given by $\vec{B} = 3\hat{i} + 4\hat{k} \text{ tesla}$. Calculate the magnetic flux across the surfaces each of area 2 m^2 in (i) $x - y$ plane (ii) $y - z$ plane.

(c) A wire of length 5.0 cm carries a current of 3.0 A , kept in an external uniform magnetic field of magnitude 10^{-3} Wbm^{-2} . Calculate the magnetic force exerted on the wire, if the wire is inclined at 30° with \vec{B} .

~~(10)~~

[4]

5

- (a) Derive the expression for the torque acting on a rectangular loop of N turns carrying current i placed in a uniform magnetic field \vec{B} . [7]
- (b) The first and the eleventh throw of a ballistic galvanometer are 20 cm and 16 cm respectively. Calculate the value of the logarithmic decrement. [4]
- (c) When 0.1 C of charge is passed through a moving coil Ballistic Galvanometer, a deflection of 30 mm is observed on a scale one meter away. Find the current sensitivity of the galvanometer if the time period of the coil is 10 seconds. [4]

Q7

- (a) Define self-inductance. Does it depend on the geometry of the circuit? Find the self-inductance of a solenoid of radius R and n number of turns per unit length. [7] (0)
- (b) Discuss Faraday's Laws of electromagnetic induction. Derive its differential form. [4]
- (c) Derive the reciprocity relation between mutual inductances. [4] (5)

Q8

- (a) Derive with explanation, the boundary conditions for the \vec{D} , \vec{B} , \vec{E} and \vec{H} fields using Maxwell's equations at the interface between two dielectrics. [8]
- (b) Using Maxwell's equation in dielectric medium obtain the wave equations for the electric and magnetic field vectors and find the expression for the velocity of EM wave in the medium. [7]

Physical Constants

$$\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$$

$$\mu_0 = 4\pi \times 10^{-7} \text{ Wb/Am}$$

$$c = 3 \times 10^8 \text{ m/s}$$

$$e = 1.6 \times 10^{-19} \text{ C}$$

This question paper contains 2 printed pages.

11

Your Roll No.... 2019

Sl. No. of Q.P.: 3495

Name of course : B.Sc. Physical Sciences - Old semester system

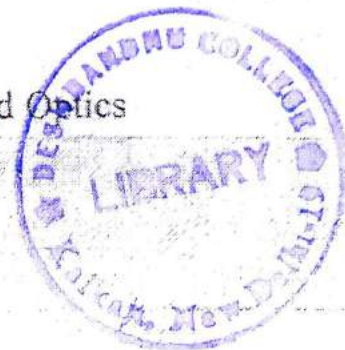
Scheme / Mode of examinations : IV - Semester

Name of the paper : Phys.-II Waves and Optics

Unique paper Code / Subject Code : 222465

Duration : 3 hours

Maximum marks : 75



Attempt any five questions. All questions carry equal marks.

- (a) Mention the criteria for a motion to be a SHM. Set up a differential equation of motion of a body executing SHM and find its general solution.

(10)

(b) Obtain the value of kinetic energy of a body at a distance of half of its amplitude in SHM.

(5)
- (a) What do you mean by Lissajous figures? Draw Lissajous figures for two SHMs with phase difference of 45° and 90° .

(5)

(b) Discuss the motion of a particle that is subjected to two perpendicular simple harmonic motion of equal frequencies, different amplitudes & having a phase difference of 90° .

(10)
- (a) Obtain a differential equation for a damped harmonic oscillator and discuss the cases of under damping, critically damping and overdamping.

(10)

(b) Show that average energy of a weakly damped harmonic oscillator decays exponentially with time.

(5)

4. (a) Differentiate between progressive and standing waves. Define nodes and antinodes. (5)
- (b) Obtain an expression for normal modes of vibrations of a string of length 'l' fixed rigidly at both ends. Discuss about overtones also. (10)
5. (a) Define interference and write conditions to obtain sustained interference. (5)
- (b) Discuss Young's Double Slits experiment and show that the thickness of bright and dark fringes are same. (10)
6. (a) Explain the Newton's Ring method to determine wave length of light. (10)
- (b) In a Newton's ring experiment the diameter of the 15th and 35th rings are 0.4cm and 0.9 cm respectively. If $R = 100$ cm, find the wavelength of light. (5)
7. (a) Differentiate between Fresnel and Fraunhofer's diffraction. (5)
- (b) What is a plane diffraction grating? Analyse the spectra formed by a diffraction grating and mention how you can determine wavelength of light by it? (10)
8. Write short notes on
- (a) Zone plate (8)
- (b) Polarisation by a Nicol Prism (7)

(12)

Roll No.....2019

S. No. of Question Paper: 3496

Unique Paper Code: 216251

Name of the Paper: Biology-II (LSPT-202)

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

Duration: 3 Hours



I

Maximum Marks: 75

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

Answer Five question including Question No.1 which is compulsory.

1. (a) Expand the following (any Five):

5x1=5

- (i) SEM
- (ii) PPLO
- (iii) MPF
- (iv) ATP
- (v) SER
- (vi) Cp DNA

(b) Fill in the Blanks (any five):

5x1=5

- (i) is a used as a fixative in Electron Microscopy?
- (ii) 70s ribosomes are found in Cells.
- (iii) is the marker enzyme of mitochondria?
- (iv) is the spontaneous movement of a substance down its concentration gradient.
- (v) are involve in the formation of cell plate.
- (vi) Mitotic spindle is made up of protein.

(c) Match the following:

5X1=5

- (i) J. D. Robertson Confocal Microscope
- (ii) Benda Mitosis
- (iii) Marvin Minsky Unit membrane model
- (iv) Walter Flemming Nucleus →

(v) Robert Brown Mitochondria

5X3=15

2. Write short notes on the following (Any Five):

- (i) X-ray diffraction
- (ii) Freeze fracturing
- (iii) Function of Chloroplast
- (iv) Binary Fission
- (v) Tight junction
- (vi) Ribosomes.

3. Draw well labeled diagram of the following (Any three):

3x5= 15

- (i) Ultrastructure of Mitochondria
- (ii) Ray diagram of confocal microscope
- (iii) Ultra structure of nucleus
- (iv) Ray diagram of Fluorescence microscope

4. (i) Briefly describe Endosymbiont theory for Mitochondria.

3x5=15

(ii) Explain semiautonomous nature of chloroplast.

(iii) Explain the structure of cell wall.

5. Differentiate between the following (any three):

3x5=15

- (i) SEM and TEM
- (ii) Active and Passive transport
- (iii) Exocytosis and Endocytosis
- (iv) Smooth and rough ER
- (v) Euchromatin and Heterochromatin

6. (i) Explain the molecular control of Cell cycle.

7.5

(ii) Why are Lysosomes referred as Suicidal bag? Explain their structure and function in detail.

7.5

7. (i) Explain with the help of diagram the structure of plasma membrane proposed by Singer and Nicolson. What are the main functions of phospholipids, proteins and carbohydrates in the cell membrane?

8

(ii) Discuss the sodium-potassium pump involved in the functions of cell membranes?

(iii) What is facilitated transport?

2

3. a) Why is red phosphorus denser and less chemically reactive than white Phosphorus?
- b) First ionization enthalpy of 15th group elements is higher than 16th group elements.
- c) H_3PO_2 and H_3PO_3 act as good reducing agents while H_3PO_4 does not.
- d) Thermal stability of hydrides of group 16 elements decreases down the group.
- e) What are interhalogen compounds? Why are they more reactive than halogens?
- f) XeF_3 and XeF_5 does not exist. (2, 2, 2, 2, 2, 2)

a) Write their shape and draw the structures of following:



b) What are the differences between:

i) Gangue and Ore

ii) Slag and Flux (2, 2)

Section B

(Physical Chemistry)

Marks : 37½

Use of scientific calculator is allowed.

Attempt *three* questions in all. Question No. 1 is compulsory.

- (a) Why do gases fail to obey ideal gas equation at high temperature and low temperature.
- (b) Explain the terms unit cell and space lattice.
- (c) Define the surface tensions and viscosity of a liquid. Explain the effect of temperature on them.
- (d) A drop of a liquid is spherical in shape. Explain.
- (e) What is the condition in which real gases starts behaving ideally? Explain briefly.

(3, 3, 3, 3 1/2)

2. (a) Derive the expression for Bragg's law of diffraction.
- (b) Derive the expression for rate constant for first order reaction. If half life for a first order reaction is 60 minutes. How long will it take for 90% of this reaction to occur?
- (c) A first order reaction is 50% completed in 30 minutes at 27°C and in 10 minutes at 47°C. Calculate the reaction rate constant at 27°C and the energy of activation of the reaction in kJ mol^{-1} .

(4, 4, 4)

3. Write short notes on (any three)

- a) Activated complex theory
- b) Drop number method
- c) Effect of temperature on Maxwell's distribution of velocities
- d) Types of symmetry elements

(4, 4, 4)

4. (a) Calculate the separation of (i) (123) planes and (ii) planes of an orthorhombic cell with $a = 0.82 \text{ nm}$, $b = 0.94 \text{ nm}$ and $c = 0.75 \text{ nm}$.

(b) (i) Describe the phenomenon of surface tension.

(ii) How will a liquid rise in a capillary tube of 0.1 mm diameter, if its density is 1.3 g cm^{-3} and surface tension is 65 dynes cm^{-1} ? ($g = 980 \text{ cm s}^{-2}$)

(c) Derive the integrated rate equation for zero order reaction. Explain graphically (i) effect of concentration on rate of the reaction, (ii) effect of concentration of reactant as reaction progresses.

(4, 4, 4)

Sf. No. of Q.P. 3499

(14)

Roll No.....2019

Unique Paper Code : 235466

Name of the course : B.Sc. (H) Computer Sc., B.Sc. (Applied Physical Sc.), Analytical Chemistry /Industrial Chemistry/B.Sc. Mathematical Science/B.Sc. Physical Science.

Name of the Paper : MAPT-404: Differential Equations

Semester : IV

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 two parts from each question.
3. All questions are compulsory.
4. Marks are indicated against each question.

1.(a) Solve the differential equation

$$(a^2 - 2xy - y^2)dx - (x + y)^2 dy = 0, \quad (6 \frac{1}{2})$$

(b) Solve:

$$x^2 y dx - (x^3 + y^3) dy = 0, \quad (6 \frac{1}{2})$$

(c) Solve:

$$y^2 + xyp - x^2 p^2 = 0, \quad (6 \frac{1}{2})$$

2.(a) Solve:

$$(D^4 + D^3 - 6D^2)y = 3e^{2x}, \quad (6 \frac{1}{2})$$

(b) Solve:

$$x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + 2y = x \log x$$

(6 1/2)

(c) Show that there exist two linearly independent solutions y_1 and y_2 , of the differential equation $a_0(x) \frac{d^2 y}{dx^2} + a_1(x) \frac{dy}{dx} + a_2(x)y = 0$ such that every solution y may be expressed as linear combination of y_1 and y_2 , where a_0, a_1 and a_2 are continuous real functions on real interval $a \leq x \leq b$ and $a_0(x) \neq 0$ for any x on $a \leq x \leq b$. (6 1/2)

3. (a) A large tank initially contains 50 gal of pure water. Starting at time $t=0$ a brine containing 2 lb of dissolved salt per gallon flows into the tank at the rate of 3 gal/min. ~~no space~~ The mixture is kept uniform by stirring and the stirred mixture simultaneously flows out of the tank at the same rate. How much salt is present at the end of 25 minutes? (6 1/2)

(b) Given that $y = e^x$ is a solution of

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

Find a linearly independent solution by reducing its order. Write the general solution. (6 1/2)

(c) Using method of variation of parameters, find the general solution of

$$\frac{d^2 y}{dx^2} + 4y = \sin^2 x$$

(6 1/2)

4. (a) Solve:

$$\frac{dx}{dt} + 4x = t - 3y,$$

$$\frac{dy}{dt} + 2x = e^t - 5y.$$

(6)

(b) Solve:

$$\frac{dx}{x(y^2 - z^2)} = \frac{dy}{y(z^2 - x^2)} = \frac{dz}{z(x^2 - y^2)}$$

(6)

(c) Solve:

(6)

$$xz^3 dx - z dy + 2y dz = 0.$$

5. (a) Eliminate the arbitrary function f from the equation :

$$z = f\left(\frac{xy}{z}\right)$$

to form the corresponding partial differential equation. (6)

- (b) Find the general solution for the differential equation : (6)

$$(z^2 - 2yz - y^2) p + (xy + xz) q = xy - xz.$$

- (c) Find the complete integral of the equation : (6)

$$(p + y)^2 + (q + x)^2 = 1.$$

6. (a) Find the complete integral of the equation : (6)

$$x^2 p^2 + y^2 q^2 = z^2.$$

- (b) Show that the equations : (6)

$$xp = yq, \quad z(xp + yq) = 2xy$$

are compatible and find their solution.

- (c) Reduce the equation : (6)

$$\frac{\partial^2 z}{\partial x^2} - x^2 \frac{\partial^2 z}{\partial y^2} = 0$$

to canonical form.

Sl. No. of Q.P. 3500
 Unique Paper Code : 216453
 Name of Paper : Biodiversity – III: Plants (LSPT-408)
 Name of Course : B. Sc. (Prog.) Life Sciences
 Semester : IV
 Duration : 3 Hours
 Maximum marks : 75

15

2019



Instructions for Candidates

(Write your Roll No. on the top immediately on receipt of this question paper)
 Attempt five questions in all. Question No. 1 is compulsory.
 Attempt all parts of a question together.

Q. 1(a) Match the following 5x1=5

- | | |
|--------------------------|-----------------------|
| (i) Myocardial stimulant | (a) <i>Marchantia</i> |
| (ii) Capitulum | (b) <i>Pteris</i> |
| (iii) Chilgoza | (c) <i>Digitalis</i> |
| (iv) False indusium | (d) <i>Helianthus</i> |
| (v) Elaters | (e) <i>Pinus</i> |

(b) Define any five of the following: 5x1=5

- (i) Chlorenchyma
- (ii) Apogynous ovary
- (iii) Coenosorus
- (iv) Polyembryony
- (v) Racemose
- (vi) Gametophyte
- (vii) Caryopsis

(c) Fill in the blanks (any five): 5x1=5

- (i) Jute is a yielding plant.
- (ii) The type of inflorescence present in Lamiaceae is.....
- (iii) The common name of *Equisetum* is
- (iv) Circinate vernation is present in
- (v) The most primitive stele is
- (vi) *Hydrilla* has lot oftissue in the stem.
- (vii) Bryophytes show an advanced.....type of sexual reproduction.

Q. 2 (a) Explain the concept of centres of origin of cultivated plants as proposed by Vavilov. 5

(b) Briefly discuss the types of simple tissues present in plants. 5

(c) With the help of diagrams discuss the stelar evolution. 5

Q. 3 Differentiate between any three of the following: 3x5 = 15

- (a) Antheridiophore and Archegoniophore of *Marchantia*
- (b) Racemose and Cymose inflorescence
- (c) Monocot root and dicot root

(d) Root and Rhizophore of *Selaginella*

Q. 4 Draw the labeled diagrams of any three of the following:

3x5 = 15

- (a) T. S. rachis of *Pteris*
- (b) L.S. *Equisetum* cone
- (c) V. S. *Cycas* leaflet
- (d) L.S. sporophyte of *Funaria*
- (e) L. S. female cone of *Pinus*

Q. 5 Write short notes on any three of the following:

3 X 5 = 15

- (a) Merits and demerits of Bentham and Hooker's system of classification
- (b) Heterospory and seed habit
- (c) Embryogeny in *Pinus*
- (d) Characteristic features of Solanaceae and Poaceae
- (e) Economic importance of Jute

Q. 6 (a) Write the botanical name, family, part used and important uses of the following:

3 X 2 = 7.5

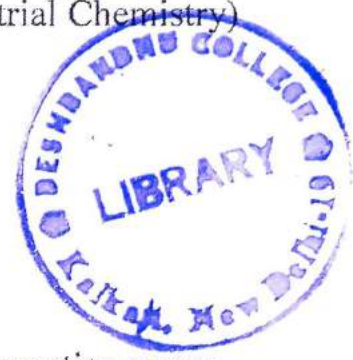
- (i) Coffee
 - (ii) **Chick pea**
 - (iii) Rice
- (b) Enumerate characteristic features of pteridophytes.
- (c) Bryophytes are amphibians of plant kingdom. Discuss

5

2.5

S.No of Question Paper : 3503
 Unique Paper Code : 217463
 Name of the Paper : Industrial Chemistry-IV (ICPT-404)
 (Pharmaceuticals, Fermentation, Pesticides & Perfumes)
 Name of the Course : B.Sc. Applied Physical Sciences(Industrial Chemistry)
 Semester : IV
 Duration : 3 Hours
 Maximum Marks : 75

J



Instructions for Candidates

1. Write your Roll No on the top immediately on receipt of this question paper.
2. Attempt any five questions. All questions carry equal marks.

Question 1: Attempt any five out of the following: (3 x 5)

- a) Discuss the synthesis of Lysine by fermentation process.
- b) Give the full form of AZT, its structure and uses.
- c) List the various raw materials used in nail polish preparation and give their roles.
- d) Give technical manufacture of malathion.
- e) What are emulsifiers? Give an example.
- f) Differentiate between sulpha drugs and sulphur drugs with suitable example.

Question 2: (5 x 3)

- a) Differentiate between Aerobic and Anaerobic Fermentation.
- b) List the raw materials required in the preparation of shampoo and explain their roles.
- c) Discuss the industrial preparation of Penicillin.

Question 3: (5 x 3)

- a) What do you understand by cardiovascular drugs and Antilaprosy drugs? Give one example for each.
- b) What is Structure Activity Relationship (SAR)? Discuss it with a suitable example.
- c) Differentiate between vanishing cream and cold cream. Give their preparation.

Question 4: Write short notes (any three)

(5 x 3)

- a) Hair spray
- b) Antibacterial and antifungal agents
- c) Organophosphates
- d) Cardiovascular drugs

Question 5: Attempt any three

(5 x 3)

- a) What are essential oils and write their importance in cosmetic industries.
- b) How Glutamic acid is produced by the fermentation process.
- c) Give synthesis and mode of action of carbofuran.
- d) What do you understand by Retrosynthesis? Explain it with a suitable drug synthesis.

Question 6: Attempt any three

(5 x 3)

- a) What are Phenobarbitals? Discuss any one drug's synthesis of Phenobarbitals.
- b) Discuss the synthesis of vitamin C.
- c) Write the name of any two Organochlorine pesticides and mention their merits and demerits.
- d) Describe the method of preparation of sunscreen lotion and discuss its advantages.

Sl. No. of Q.P. : 3504

(17)

16/5
2019

Unique paper Code 234461

Name of the Paper CSPT-404 Operating System

Name of the Course B. Sc. (Phy. Sc.) / B. Sc. (Math. Sc.) Non-CBCS

Semester IV

Duration of Examination 3 Hrs.

Maximum Marks 75



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Instructions for candidates:

Write your Roll no. on top immediately on receipt of the question paper.

Question no: 1 is compulsory.

Attempt any five questions from remaining seven questions.

All parts of a question should be done together.

Q1.

- (a) Name two services provided by operating system. (2)
- (b) How does an operating system prevent the CPU from being infinitely over run by user program? (2)
- (c) Differentiate between pre-emptive and non-pre-emptive job scheduling schemes. (3)
- (d) List essential requirements to solve critical code section problem. (3)
- (e) Differentiate between multiprogramming and multiprocessing. (3)
- (f) What is use of a page table in paging memory management? (3)
- (g) What is address binding? (3)
- (h) Explain briefly the attributes of a file. (3)
- (i) Describe why authentication is important for file protection. (3)

Q2.

- (a) Consider the following set of processes: (6)

Process	Arrival time	Burst time
P1	2	3
P2	0	5
P3	1	3
P4	3	6

- (i) Draw Gantt charts showing execution of these processes using FCFS, Round Robin (Quantum = 2) scheduling schemes.
- (ii) Compute the response time and average waiting time in each scheme.
- (b) Describe multilevel feedback queue scheduling. (4)

Q3.

- (a) Define a process. Explain different process states. (6)
- (b) Define the essential properties of time_sharing operating system. (4)

- Q4. (a) Differentiate between static and dynamic linking.. (6)
- (b) What are the reasons for a process to terminate the execution of its child processes? (4)
- Q5. (a) Describe optimal page replacement scheme with help of an example. (6)
- (b) Assuming the 1-KB page size, what are the page numbers and offsets for the following address references? (4)
- (i) 2375
 - (ii) 4075
 - (iii) 33
 - (iv) 14866
- Q6. (a) Given memory partitions of 200KB, 600KB, 100KB, 300KB and 500KB (in order). (6)
- How would each of the first fit, best fit and worst fit algorithms allocate memory to processes of size 350 KB, 150KB, 250KB and 50KB(in order)? Which algorithm makes the most efficient use of memory?
- (b) What is external fragmentation? How can it be minimised? (4)
- Q7. (a) What are different access methods for a file? Explain. (6)
- (b) What is bit vector? What are its usages? (4)
- Q8. Write short notes on (any two): (2x5)
- (a) Indexed allocation
 - (b) Tree structured directory
 - (c) Page fault