This question paper contains **2** printed pages]

LB—13—2024

FACULTY OF ARTS/COMMERCE/SCIENCE

B.A./B.Com./B.Sc. (Second Year) (Third Semester) EXAMINATION

MARCH/APRIL, 2024

MARATHI (S.L.)

Paper III

(अक्षरविद्या)

(Tuesday, 2-4-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—Two Hours *Maximum Marks*—50

N.B. :— (*i*) **सर्व** प्रश्नांना समान गुण आहेत.

(*ii*) **सर्व** प्रश्न सोडवणे अनिवार्य आहे.

1. पुढीलपैकी कोणताही **एक** प्रश्न सोडवा : 10

(*i*) मानवाला परमेश्वराची जाणीव त्याच्या दृष्टीनुसार होत असते हा विचार 'हत्तीचा दृष्टांत' मधून कसा व्यक्त झाला आहे ? ते लिहा.

(*ii*) संत गाडगेबाबा यांनी आपल्या 'शिक्षणविषयक कीर्तना'तून समाजाला कोणता उपदेश केला आहे ? ते लिहा.

2. पुढीलपैकी कोणताही **एक** प्रश्न सोडवा : 10

(*i*) भ्रष्ट शासकीय व्यवस्थेविरुद्धचा लढा लेखक विदुर महाजन यांनी कशाप्रकारे चित्रित केला आहे ? ते लिहा.

(*ii*) 'यशोधराचा निर्धार' या पाठाचा आशय तुमच्या शब्दांत लिहा.

P.T.O.

3. पुढीलपैकी कोणताही **एक** प्रश्न सोडवा : 10

(*i*) 'कुठे दबा धरून बसले आहे तुफान' या कवितेचा आशय स्पष्ट करा.

(*ii*) दारिद्र्य आणि भूकेच्या वेदनेचे चित्रण 'सरावन महिना आला की' मधून कसे आले आहे ? ते लिहा.

4. पुढीलपैकी कोणताही **एक** प्रश्न सोडवा : 10

(*i*) 'विज्ञान वंदना' या कवितेचा आशय स्पष्ट करा.

(*ii*) लोकशाही मूल्ये रुजविण्यासाठीची भावना 'सांविधानिक मूल्ये' या कवितेतून कवीने कशी व्यक्त केली आहे ? ते लिहा.

5. पुढीलपैकी 'अ' व 'ब' गटातील प्रत्येकी **एक** टीप लिहा : 10

(अ) (*i*) अर्थदर्शक चिन्हे

(*ii*) श्लेष

(ब) (*i*) स्वल्पविराम

(*ii*) यमक.

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LB—42—2024

FACULTY OF ARTS/COMMERCE/SCIENCE

B.A./B.Com./B.Sc. (Third Semester) EXAMINATION

MARCH/APRIL, 2024

ENGLISH (Compulsory)

(AECC : English Communication–III)

(Thursday, 4-4-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—Two Hours *Maximum Marks*—50

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Explain in your own words the moral of story 'The Model Millionaire'. 10

Or

'The Lost Child' is a story of family bonding and values. Discuss.

2. Write a critical appreciation of the poem, 'The Gift of India'. 10

Or

What are the precautions given by Max Ehrmann in the poem, 'Desiderata'.

3. Sketch the character of Subhas Chandra Bose revealed in 'At School'. 10

Or

Explain how Milkha Singh's 'The Flying Sikh' reflects that 'there are no shortcuts to success'.

P.T.O.

4. Explain the child's fascination towards nature presented in the short story 'The Lost Child'. 10

Or

Explain the central theme of the story 'The Model Millionaire'.

5. (*a*) Change the reported speech (any *five*) : 5

(*i*) He said, "I am writing a letter."

(*ii*) "Keep quiet", she said.

(*iii*) The man said to the boys, "Is this your playground ?"

(*iv*) Lear said, "How ugly the scene is !"

(*v*) He said to Rita, "You are a good girl."

(*vi*) He said, "This is the book I want".

(*vii*) The doctor said to the patient, "Give up smoking".

(*b*) Write short answer to the following (any *one*) : 5

(*i*) Role of Print Media.

(*ii*) Writing for the Electronic Media.

This question paper contains **2** printed pages]

PA—29—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

MARCH/APRIL, 2024

(New Pattern)

PHYSICS

Paper–VI

(Waves, Oscillations)

(Saturday, 13-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* *All* questions are compulsory and carry equal marks.

1. Derive an analytical treatment of stationary waves for open end pipe at the other end. 15

Or

(*a*) Obtain an expression for energy of plane progressive wave. 8

(*b*) Explain and obtain the expression for frequency and period of vibration of string. 7

P.T.O.

2. What is damped vibtrations ? Derive differential equation for damped harmonic motion and obtain its general solution. 15

Or

(*a*) Explain in detail applications of ultrasonic waves. 8

(*b*) Derive the expression for reverberation time. 7

3. Attempt any *two* of the following : 10

(*a*) Derive the differential equation of wave motion.

(*b*) Show that energy is not transferred in a stationary wave.

(*c*) Explain free and forced vibrations.

(*d*) Explain with diagram magnetostriction oscillator.

This question paper contains **2** printed pages]

PA—47—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

MARCH/APRIL, 2024

(New Course)

PHYSICS

Paper–VII

(Statistical Physics, Electromagnetics and Theory of Relativity)

(Tuesday, 16-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions.

(*ii*) Log table is allowed.

(*iii*) Non-programmable calculator is allowed

(*iv*) Figures to the right hand indicate full marks.

1. Derive an expression for Fermi-Dirac distribution law. 15

Or

(*a*) Obtain the relation $S = K \log W_{max}$, where S is the entropy of the system and W_{max} is the maximum thermodynamic probability. 8

P.T.O.

(*b*) Explain the terms micro and macro states. 7

2. Derive an expression for Lorentz transformations. 15

Or

(*a*) What is displacement current ? Derive an expression for displacement current. 8

(*b*) Explain electromagnetic wave equation in terms of B. 7

3. Write short notes on any *two* of the following : 10

(*a*) Time dilation in theory of relativity

(*b*) Additive and multiplication rule of probability

(*c*) Phase space

(*d*) Poynting vector

This question paper contains **3** printed pages]

PA—08—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New Course)

CHEMISTRY

Paper–VI

(Organic and Inorganic Chemistry)

(Saturday, 6-4-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— Attempt *all* questions.

1. Solve any *three* of the following : 3×5=15

(*a*) Why water is known as universal solvent ? Explain the dipole moment property of solvent.

(*b*) Explain the role of the following organic reagents in qualitative analysis :

(*i*) 8-hydroxy quinoline

(*ii*) Dimethyl glyoxime.

(*c*) Discuss the acid-base reaction in liq. NH_3 and liq. SO_2.

(*d*) What are interfering radicals ? Explain the removal of borate.

(*e*) Define common ion effect. Explain the application of common ion effect in separation of II and III B group basic radicals in qualitative analysis.

P.T.O.

2. Solve any *three* of the following : 3×5=15

(*a*) Explain Aldol condensation reaction with mechanism.

(*b*) How will you prepare benzene sulphonic acid from benzene ? Explain with mechanism.

(*c*) What are organomagnesium compounds ? How will you obtain the following from CH_3MgBr :

(*i*) 2-Propanone

(*ii*) Ethanoic acid.

(*d*) Explain Meerwein-Pondorf-Verley reduction with mechanism.

(*e*) How will you prepare ethyl acetoacetate by Claisen-condensation reaction ? Explain with mechanism.

3. Solve any *two* of the following : 2×5=10

(*a*) Explain Baeyer-Villiger oxidation reaction with mechanism.

(*b*) Write notes on :

(*i*) Hydrolysis of oils and fats

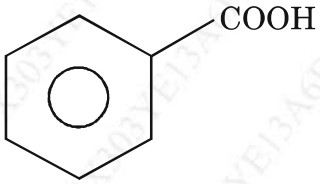
(*ii*) Saponification value.

(*c*) What are synthetic detergents ? Explain different types of detergents.

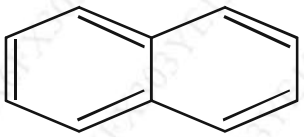
(*d*) Predict 'X' in the following reactions :

(*i*) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3 + H-\overset{\overset{O}{\|}}{C}-H + HN(CH_3)_2 \xrightarrow{HCl} \text{'X'}$

(*ii*) $CH_3-NO_2 \xrightarrow{\text{'X'}} CH_3-NH_2$

(*iii*)  + Conc . $HNO_3 \xrightarrow[\Delta]{\text{Conc . } H_2SO_4}$ 'X'

(*iv*) $CH_3-\overset{\overset{O}{\|}}{C}-Cl + \text{'X'} \xrightarrow{\Delta} CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_3 + C_2H_5ZnCl$

(*v*)  $\xrightarrow[(ii)\ NaOH]{(i)\ O_2/V_2O_5,\ \Delta}{(iii)\ HCl}$ 'X'

This question paper contains **3** printed pages]

PA—19—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

MARCH/APRIL, 2024

(CBCS/New Pattern)

CHEMISTRY

Paper–VII

(Physical and Inorganic Chemistry)

(Wednesday, 10-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions

(*ii*) Use logarithmic table and calculator is allowed.

1. Attempt any *three* of the following :

(*a*) Define radioactivity ? Explain the characteristics of β-particles.

(*b*) Define the following terms :

(*i*) Isotope

(*ii*) Isomer

(*iii*) Isotones

(*iv*) Isobar

(*v*) Nuclear fission.

P.T.O.

(*c*) Write application of radioisotopes in medicine and agricultural field.

(*d*) Explain the following steps involved in gravimetric analysis :

(*i*) Drying

(*ii*) Ignition

(*iii*) Weighing

(*e*) Explain any *two* factors affecting on precipitation.

2. Solve any *three* of the following :

(*a*) State Heisenberg's uncertainty principle

[Calculate de-Broglie's wavelength of a body of mass 0.1 kg. moving with velocity 1000 m sec^{-1}]

(*b*) Explain Davisson-Germer experiment.

(*c*) State Joule's law and explain Joule–Thomson effect.

(*d*) Write the physical significance of entropy.

(*e*) Explain water system with phase diagram.

3. Solve any *two* of the following :

(*a*) Derive Schrodinger's wave equation. Write down the physical significance of ψ and ψ^2.

(*b*) State third law of thermodynamics. Write any *three* statements of second law of thermodynamics.

Or

(*a*) Discuss entropy change in fusion of solid.

(*b*) Transition from one crystalline form to another.

(*c*) Describe phenol-water system on the basis of phase rule.

This question paper contains **2** printed pages]

PA—268—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New Course)

INDUSTRIAL CHEMISTRY

Paper VII

(Chemical Reaction Engineering-I)

(Saturday, 11-05-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Scientific calculator and log table is allowed.

(*ii*) Solve *all* questions.

1. Derive and explain irreversible reaction in parallel. 15

Or

(*a*) Hydrolysis of ethyl acetate by NaOH using equal concentration of the reactant, was studied by titrating 25 ml of reaction mixture a different time interval against standard acid. From the data given below established that is second order reaction : 8

t in time	ml acid used
0	16.00
5	10.24
15	6.13

P.T.O.

25	4.32

(*b*) An absolute H_2O_2 when titrating against $KMnO_4$ solution at different time interval gave the following result : 7

t in min	**Volume of $KMnO_4$ in ml**
0	23.8
10	14.7
20	9.1

Show the decomposition of H_2O_2 is first order reaction.

2. Explain in detail kinetics modes for non-elementary reaction. 15

Or

At 500 K the rate of biomolecular reaction is ten times the rate at 400 K. Find the activation energy for this reaction :

(*a*) from Arrhenius law 7

(*b*) from collision theory

and what is the % difference in rate of reaction at 600 K predicted by these two methods. 8

3. Write short notes on (any *two*) : 10

(*a*) Rate of reaction

(*b*) Order of reaction and molecularity

(*c*) Batch reactor

(*d*) Autocatalytic reaction.

This question paper contains **3** printed pages]

PA—59—2024

FACULTY OF ARTS/SCIENCE

B.A./B.Sc. (Second Year) (Third Semester) EXAMINATION

MARCH/APRIL, 2024

(New Pattern)

MATHEMATICS

Paper VI

(Real Analysis-I)

(Friday, 19-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. (*a*) Prove that, a countable union of countable sets is countable. Also show that set of rational numbers in [0, 1] is countable. 15

Or

(*b*) Attempt the following :

(*i*) Prove that, every convergent sequence is bounded and has unique limit. 8

(*ii*) Show that there is no rational number whose square is 2. 7

P.T.O.

2. (*a*) Attempt the following :

(*i*) If $\{a_n\}$, $\{b_n\}$ and $\{c_n\}$ are three sequences such that : 8

(1) $a_n \leq b_n \leq c_n, \forall\ n$

(2) $\lim_{n\to\infty} a_n = \lim_{n\to\infty} c_n = l,$

then prove that $\lim_{n\to\infty} b_n = l$

(*ii*) Show that the sequence $\{S_n\}$ where

$$S_n = 1 + \frac{1}{2!} + \frac{1}{3!} + \ldots + \frac{1}{n!},\ n \leftarrow N$$

is convergent. 7

Or

(*b*) Attempt the following :

(*i*) If Σu_n and Σv_n are two positive term series and there exist a positive integer m such that 8

$$\frac{u_n}{u_{n+1}} \geq \frac{v_n}{v_{n+1}}, \forall\ n \geq m,$$

then prove that

(1) Σu_n convergent if Σv_n is convergent

(2) Σv_n is divergent if Σu_n is divergent

(*ii*) Show that the series :

$$\frac{1.2}{3^2.4^2} + \frac{3.4}{5^2.6^2} + \frac{5.6}{7^2.8^2} + \ldots.$$

is convergent. 7

3. Attempt any *two* of the following : 10

(*a*) Write the properties for a set to be a complete-ordered field.

(*b*) If $\{a_n\}$, $\{b_n\}$ be two sequences such that $\lim_{n \to \infty} a_n = a$, $\lim_{n \to \infty} b_n = b$, then prove that :

$$\lim_{n \to \infty} (a_n + b_n) = \lim_{n \to \infty} (a_n) + \lim_{n \to \infty} (b_n) = a + b$$

(*c*) State the Raabe's test and the logarithmic test.

(*d*) Test for the convergence, the series whose nth term is $\left\{(n^3 + 1)^{1/3} - n\right\}$.

This question paper contains **3** printed pages]

PA—89—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

MATHEMATICS

Paper VIII

(Ordinary Differential Equations)

(Wednesdday, 24-04-2024) **Time : 2.00 p.m. to 4.00 noon**

Time—Two Hours *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Attempt (A) or (B) (*a*), (*b*) in Question No. **1** and **2**.

1. (A) Explain the method of finding the solution of homogeneous differential equation of the form : 15

$$\frac{dy}{dx} = \frac{f_1(x, y)}{f_2(x, y)},$$

where f_1, f_2 are expressions homogeneous and the same degree in x and y.

Also solve the non-homogeneous differential equation :

$$(3y - 7x + 7)\,dx + (7y - 3x + 3)\,dy = 0.$$

P.T.O.

Or

(B) (*a*) Define linear differential equation and solve : 8

$$\frac{dy}{dx} + y = e^{-x}.$$

(*b*) Solve : 7

$$p^3 + 2xp^2 - y^2p^2 - 2xy^2p = 0.$$

2. (A) Find the complementary function of the linear differential equation with constant coefficients P_1, P_2, ... P_n of the form : 15

$$\frac{dy^n}{dx^n} + P_1\frac{dy^{n-1}}{dx^{n-1}} + P_2\frac{dy^{n-2}}{dx^{n-2}} + ... + P_n y = X,$$

when roots of the auxiliary equation are distinct and equal.

Or

(B) (*a*) Solve : 8

$$\frac{d^3y}{dx^3} + y = 3 + e^{-x} + 5e^{2x}.$$

(*b*) Solve : 7

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

3. Attempt any *two* of the following : 5 each

(*a*) Solve :

$$a(xdy + 2ydx) = xydy.$$

(*b*) Find the solution of the linear differential equation :

$$\frac{dy}{dx} + P_y = Q$$

Where P and Q are functions of x or constants.

(*c*) Find the particular integral of linear differential equation with constant coefficient corresponding to a term of the form XV in the second member.

$$\frac{d^n y}{dx^n} + P_1 \frac{dy^{n-1}}{dx^{n-1}} + P_2 \frac{dy^{n-2}}{dx^{n-2}} + \ldots\ldots\ldots + P_n y = X,$$

Where V is any function of x.

(*d*) Solve :

$$x^2 \frac{dy^2}{dx^2} + 7x \frac{dy}{dx} + 5y = x^5.$$

This question paper contains **2** printed pages]

PA—28—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New Course)

BOTANY

Paper–VI

(Plant Anatomy)

(Saturday, 13-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Figures to the right indicate full marks.

(*iii*) Illustrate your answer with suitable diagram, scheme etc.

1. Describe the organization of shoot apical meristem. 15

Or

Write notes on :

(*i*) Phloem 8

(*ii*) Oil glands and hydathodes 7

P.T.O.

2. Describe the stem anatomy of dicotyledonous plant. 15

Or

Write notes on :

(*i*) Normal secondary growth in stem of dicotyledons. 8

(*ii*) Anomalous secondary growth in Bignonia stem. 7

3. Write short notes on (any *two*) : 10

(*i*) Tunica corpus theory

(*ii*) Collenchyma

(*iii*) Primary growth in roots of plants

(*iv*) Economic importance of wood.

This question paper contains **2** printed pages]

PA—46—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New Course)

BOTANY

Paper–VII

(Plant Physiology and Bio-Chemistry)

(Tuesday, 16-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions

(*ii*) Draw well labelled diagrams wherever necessary.

1. Define ascent of sap. Describe in detail transpiration pull theory. 15

Or

Write in brief :

(*a*) Deficiency symptoms of nitrogen and potassium. 8

(*b*) Ion exchange theory. 7

P.T.O.

2. What are plant growth hormones ? Describe practical applications of Auxins and Gibberellins. 15

Or

Write in brief :

(*a*) Biological functions of carbohydrates. 8

(*b*) Methods of breaking seed dormancy. 7

3. Write short notes on any *two* of following : 10

(*a*) Structure of stomata

(*b*) Hydroponic techniques

(*c*) Vernalization and Devernalization.

(*d*) Biological functions of organic acids.

This question paper contains **2** printed pages]

PA—60—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

ZOOLOGY

Paper VI

(Physiology)

(Friday, 19-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Illustrate your answers with suitable and labelled diagrams wherever necessary.

1. Describe structure of nephron and add a note on mechanism of urine formation. 15

Or

(*a*) Describe physiology of digestion of carbohydrates. 8

(*b*) Describe mechanism of respiration in man. 7

2. Describe structure, functions and hormonal disorders of thyroid gland. 15

P.T.O.

Or

(*a*) Describe ultra-structure of skeletal muscles. 8

(*b*) Explain structure of generalised neuron and add a note on types of neurons. 7

3. Write short notes on any *two* of the following : 10

(*a*) Transport of O_2 and CO_2

(*b*) E.C.G.

(*c*) Cardiac muscles

(*d*) Islet's of Langahans.

This question paper contains **2** printed pages]

PA—75—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Third Semester) EXAMINATION

MARCH/APRIL, 2024

(New Pattern)

ZOOLOGY

Paper VII

(Biochemistry)

(Monday, 22-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

Note :— (*i*) Attempt *All* questions.

(*ii*) Illustrate your answers with suitably labelled diagrams wherever necessary.

1. Explain classification of lipids. 15

Or

(*a*) Define enzymes. Describe classification of enzymes. 8

(*b*) Describe in detail pH and colligative properties of water. 7

P.T.O.

2 Explain in detail Kreb's cycle. 15

Or

(*a*) Explain in detail β-oxidation pathway. 8

(*b*) Write in detail transamination and deamination. 7

3. Attempt any *two* out of four : 10

(*a*) Oligosaccharides

(*b*) Lock and key model

(*c*) Ketosis

(*d*) Glycogenesis.

This question paper contains **2** printed pages]

PA—267—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

FISHERY SCIENCE

Paper–VII

(Fish Developmental Biology)

(Saturday, 11-05-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions.

(*ii*) Draw suitable diagrams wherever necessary.

1. Explain in detail types of eggs in fishes. 15

Or

Write notes on :

(*a*) Blastula in Fish 8

(*b*) Gastrulation in fishes. 7

P.T.O.

2. Describe the sexual dimorphism in fishes with suitable examples. 15

Or

Write notes on :

(*a*) Ponderal index 8

(*b*) Length-weight relationship. 7

3. Write notes on any *two* of the following : 10

(*a*) Cleavage in fishes

(*b*) Morula

(*c*) Parental case in fishes

(*d*) Methods of age and growth determination.

This question paper contains **2** printed pages]

PA—155—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

MICROBIOLOGY

Paper–VII

(Immunology)

(Friday, 03-05-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions.

(*ii*) Represent your answers with suitable diagrams if necessary.

(*iii*) Answer to the point.

1. What is infection ? Explain types of infection with suitable examples. 15

Or

Write on :

(*a*) Properties of Antigen 8

(*b*) Humoral immune response. 7

P.T.O.

2. Illustrate agglutination reaction with reference to mechanism and application. 15

Or

Explain briefly :

(*a*) Anaphylaxis 8

(*b*) Type-II hypersensitivity reaction. 7

3. Write short notes on (any *two*) : 10

(*a*) Structure and function of leucocytes

(*b*) Clonal selection theory

(*c*) Virus neutralization test

(*d*) Contact dermatitis.

This question paper contains **2** printed pages]

PA—112—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

MARCH/APRIL, 2024

ELECTRONICS

Paper VI

(Amplifiers)

(Tuesday, 30-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—Two Hours *Maximum Marks*—40

Note :— (*i*) Attempt *All* questions.

(*ii*) Illustrate your answer with labelled diagrams wherever necessary.

1. Describe the following methods used for transistor biasing with neat diagram : 15

(*i*) Base bias with collector feedback.

(*ii*) Voltage divider bias.

Or

(*a*) Explain an equivalent circuit for BJT transconductance model with neat diagram. 8

(*b*) Explain working of CE amplifier and derive voltages gain expression in terms of hybrid parameter. 7

P.T.O.

2. Explain op-amp used an on inverting and non-inverting amplifier. 15

Or

(*a*) Describe the function of op-amp as an adder. 8

(*b*) Describe the function of op-amp as an integrator. 7

3. Attempt any *two* : 10

(*a*) Explain DC load line and Q-point

(*b*) Explain hybrid parameter for a transistor

(*c*) Explain the concept of virtual ground in op-amp

(*d*) Describe op-amp as differentiator.

This question paper contains **2** printed pages]

PA—156—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

ELECTRONICS

Paper–VII

(Microprocessor and its Applications)

(Friday, 03-05-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Draw neat and labelled diagrams wherever necessary

(*iii*) Numbers to the right indicate full marks.

1. Draw functional pin diagram of Intel 8085. Describe functions of the following pins : 15

(*i*) HOLD

(*ii*) ALE

(*iii*) $\overline{RD}$

(*iv*) $\overline{WR}$.

P.T.O.

Or

(*a*) Explain indirect and implicit addressing modes of 8085 with suitable examples. 8

(*b*) Explain working of the following instructions : 7

(*i*) MVI data

(*ii*) ANA *r*

2. Write an ALP for microprocessor 8085 : 15

(*i*) To add two bytes (sum 8-bit)

(*ii*) To determine 1's complement of a byte

Explain each with suitable input data.

Or

(*a*) Draw functional pin diagram of IC 8255. 8

(*b*) Explain Mode-0, Mode-1 and Mode-2 of operation of IC 8255 in short. 7

3. Write short notes on any *two* : 10

(*a*) Block diagram of microprocessor based system

(*b*) Instruction formats of 8085

(*c*) ALP for subtraction of two bytes

(*d*) CWR of 8255.

This question paper contains **2** printed pages]

PA—325—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

COMPUTER SCIENCE

Paper–VII

(Programming in C++)

(Saturday, 11-05-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks

(*iii*) Assume suitable data, if necessary.

1. What is OOPs ? Explain basic concept of OOPs. 15

Or

(*a*) Explain decision-making statement in detail. 8

(*b*) Write a C++ program to calculate a factorial of given integer number. 7

P.T.O.

2. What is function ? Explain call by value and call by reference with example. 15

Or

(*a*) Explain static data member with example. 8

(*b*) Write a C++ program to create a student class and show student information like–Roolno, Student Name, Student Class, Student Subject, Student Result. 7

3. Write short notes on (any *two*) : 10

(*a*) Structure of C++

(*b*) Operators in C++

(*c*) Constructor

(*d*) Friend Function.

This question paper contains **2** printed pages]

LB—22—2024

FACULTY OF ARTS/COMMERCE/SCIENCE

B.A./B.Com/B.Com. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

MARATHI (Second Language)

(साहित्य सरिता-IV)

(Wednesday, 03-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—50

N.B. :— (*i*) **सभी** प्रश्न सोडविणे अनिवार्य आहे.

(*ii*) **सर्व** प्रश्नांना समान गुण आहेत.

1. खालीलपैकी कोणताही **एक** प्रश्न सोडवा : 10

(*i*) डॉ. गंगाधर पानतावणे यांनी न्यूयॉर्क परिषदेतील कोणकोणते अनुभव सांगितले आहेत ? ते लिहा.

(*ii*) डॉ. जनार्दन वाघमारे यांनी महात्मा बसवेश्वरांच्या समाजकार्यावर कसा प्रकाश टाकला आहे ते स्पष्ट करा.

2. खालीलपैकी कोणताही **एक** प्रश्न सोडवा : 10

(*i*) शिरीष गोपाळ देशपांडे यांना नाट्यदिग्दर्शनाचे धडे गिरवताना आलेल्या अनुभवाचे वर्णन करा.

(*ii*) 'तिआनमेन म्हणजे स्वर्गीय राजवाड्याचं प्रवेशद्वार, असे लेखिका उर्मिला चाकूरकर यांनी का म्हटले आहे ? ते विशद करा.

P.T.O.

3. खालीलपैकी कोणताही **एक** प्रश्न सोडवा : 10

(*i*) 'नांगऱ्यांचे बळ' या गाथेचा आशय तुमच्या शब्दांत लिहा.

(*ii*) संत नामदेवांच्या **दोन** अभंगातून आलेले विचार स्पष्ट करा.

4. खालीलपैकी कोणताही **एक** प्रश्न सोडवा : 10

(*i*) 'पेरणी' या कवितेआधारे माऊलीने आयुष्यभर भोगलेल्या व्यथांची खंत कोणत्या शब्दात मांडली आहे ? ते लिहा.

(*ii*) 'पाखरांचे हायकू' या कवितेचा आशय स्पष्ट करा.

5. टिपा लिहा :

(अ) खालील **दोहों**पैकी कोणतीही **एक** टीप लिहा : 5

(*i*) समासाचे प्रकार

(*ii*) उपमा अलंकार

(आ) खालील **दोहों**पैकी कोणतीही **एक** टीप लिहा : 5

(*ii*) द्वंद्व समास

(*ii*) रूपक अलंकार.

This question paper contains **2** printed pages]

LB—21—2024

FACULTY OF HUMANITIES

B.A. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

HINDI (S.L.)

Paper–IV

(नाटक तथा प्रयोजनमूलक हिंदी)

(Wednesday, 03-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—50

N.B. :— (*i*) **सभी** प्रश्न अनिवार्य हैं।

(*ii*) **सभी** प्रश्नों के समान अंक हैं।

1. 'वीमा' नाटक में व्यक्त विभिन्न समस्याओं पर प्रकाश डालिए। 10

अथवा

'वीमा' नाटक के कथावस्तु की समीक्षा कीजिए।

2. 'प्रेम के पौधे पर जात की कुल्हाड़ी मार रहे हैं, आप' वीमा नाटक के प्रस्तुत कथन की समीक्षा कीजिए। 10

अथवा

'वीमा' नाटक की मूल संवेदना विशद कीजिए।

P.T.O.

3. ई-मेल प्रेषण विधि को समझाइए। 10

अथवा

रोजगार प्राप्ति की दृष्टि से विभिन्न मोबाईल ॲप का परिचय दीजिए।

4. वेब सर्चिंग का अर्थ और महत्व स्पष्ट कीजिए। 10

अथवा

दूरदर्शन विज्ञापन लेखन की प्रविधि स्पष्ट कीजिए।

5. टिप्पणियाँ लिखिए :

(अ) 'वीमा' नाटक में विकलांग चेतना। 5

अथवा

'वीमा' नाटक के देवतसिंह का चरित्र-चित्रण।

(ब) मोबाईल विज्ञापन का महत्व। 5

अथवा

वेब सर्चिंग का स्वरूप।

This question paper contains **2** printed pages]

LB—60—2024

FACULTY OF HUMANITIES (ARTS, COMMERCE, SCIENCE)

B.A./B.Com./B.Sc. (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

ENGLISH COMPULSORY

Paper–IV

(AECC : English Communication)

(Friday, 05-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Describe all aspects of the setting of the story. 'The Sniper'. 10

Or

Sketch the character of sinner.

2. Comment on the theme of the poem 'Courage'. 10

Or

Examine the theme of the speaker's genuine love for the lady in the poem 'Love'.

P.T.O.

3. Illustrate the human factors for happiness as proposed by the Dalai Lama. 10

Or

Explain the message given by Bhagat Singh to the Indian youth in the essay. 'To Youth'.

4. Write a critical appreciation of the poem 'Love'. 10

Or

Discuss the dehumanizing effects of war as reflected in 'The Sniper'.

5. (A) Change the voice (any *five*) : 5

(*i*) She gives me a pen.

(*ii*) I was eating an apple.

(*iii*) We shall sing a song.

(*iv*) The teacher called the students.

(*v*) Who has called you ?

(*vi*) Help the poor.

(*vii*) She had driven a car.

(B) Write a note on social media and messaging app. 5

Or

Define electronic media. Discuss the fundamentals of writing for electronic media.

This question paper contains **2** printed pages]

PA—38—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

PHYSICS

Paper VIII

(Optics and Lasers)

(Monday, 15-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

Note :—All questions are compulsory.

1. Explain Ramsdem eyepiece and their cardinal points. 15

Or

(*a*) Explain Fraunhofer's diffraction due to double slit. 8

(*b*) Describe in detail Newton's ring to determine wavelength of sodium light. 7

2 Describe polarization by reflection with neat labelled diagram and explain the Brewster's law. 15

P.T.O.

Or

(*a*) Explain the following terms in detail : 8

(1) Population inversion

(2) Optical and electrical pumping.

(*b*) Explain in detail He-Ne layer. 7

3. Write short notes on (any *two*) : 10

(*a*) Properties of layers

(*b*) Resolving power of grating

(*c*) Nicol prism

(*d*) Cardinal points of an optical system.

This question paper contains **2** printed pages]

PA—53—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

MARCH/APRIL, 2024

(New Pattern)

PHYSICS

Paper–IX

(Basic Electronics)

(Thursday, 18-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* *All* questions are compulsory.

1. Give the analysis of common emitter amplifier to determine current gain, voltage gain, power gain, input impedance and output resistance. 15

Or

(*a*) Describe theory, working and characteristics of light emitting diode. 8

(*b*) Give the types of extrinsic semiconductor. 7

P.T.O.

2. What are the types of sinusoidal oscillators ? Describe Hartley Oscillator. 15

Or

(*a*) Explain inverting amplifier. 8

(*b*) Draw the block diagram of OP-Amp and discuss it. 7

3. Write short notes on (any *two*) : 10

(*a*) Varactor diode

(*b*) Common base connection

(*c*) Slew rate

(*d*) Oscillatory circuit.

This question paper contains **4** printed pages]

PA—12—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(CBCS/New Pattern)

CHEMISTRY

Paper–VIII

(Organic and Inorganic Chemistry)

(Monday, 8-4-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— Attempt *all* questions.

1. Solve any *three* of the following : 3×5=15

   (*a*) What are transition elements ? Explain anamolus electronic configuration of coppor and chromium.

   (*b*) What is lanthanide contraction ? Explain causes of lanthanides contraction.

   (*c*) Explain magnetic properties of lanthanide elements.

   (*d*) Explain the following properties of transition elements :

   (*i*) Colour

   (*ii*) Magnetic properties.

   (*e*) Give the physical and chemical properties of uranium.

P.T.O.

2. Solve any *three* of the following : 15

(*a*) What is geometrical isomerism ? Give E and Z configuration of the following :

(*i*) 2-pentene

(*ii*) 1-chloro-2-bromo-2-iodoethene.

(*b*) Explain osazone formation of glucose with mechanism.

(*c*) How will you prepare urea by Wohler's method ? What is the action of the following on urea :

(*i*) Heat

(*ii*) $SOCl_2$

(*iii*) Acetyl chloride

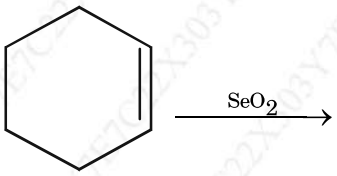
(*iv*) Nitrous acid.

(*d*) Explain the following with suitable example :

(*i*) Enantiomers

(*ii*) Diastereoisomer.

(*e*) Predict the product :

(*i*) 

(*ii*) $CH_3 - COOH + CH_2 = CH_2 \xrightarrow{BF_3}$

(*iii*) $CH_2 = CH - CHO \xrightarrow[H_2O]{OsO_4}$

(*iv*) $R–COOH + R' - OH \xrightarrow{BF_3}$

(*v*) $CH_3 - CH = CH - CH_3 \xrightarrow[H_2]{O_3}$

3. Solve any *two* of the following : 10

(*a*) How will you convert :

(*i*) Aniline to Phenyl isocyanide

(*ii*) Phenol to Aniline

(*iii*) Nitrobenzene to Aniline

(*iv*) Glucose to Glucosazone

(*v*) Glucose to Sorbitol.

(*b*) Define the following terms :

(*i*) Asymmetric carbon atom

(*ii*) Racemic mixture

(*iii*) Resolution

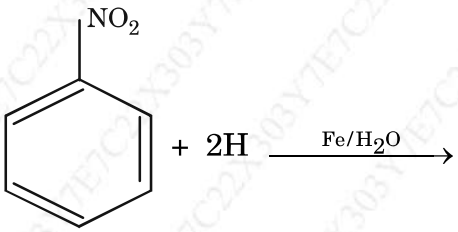
(*iv*) Plane of symmetry

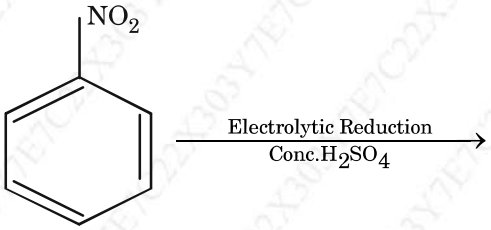
(*v*) Optical isomerism.

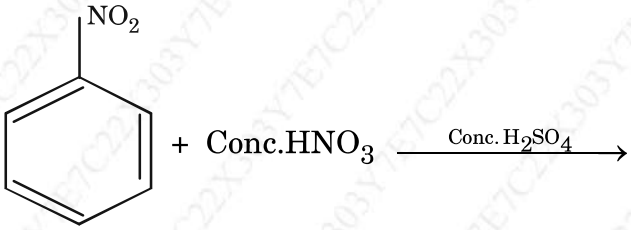
P.T.O.

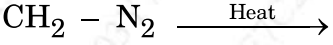
(*c*) What is mutarotation ? Give its mechanism.

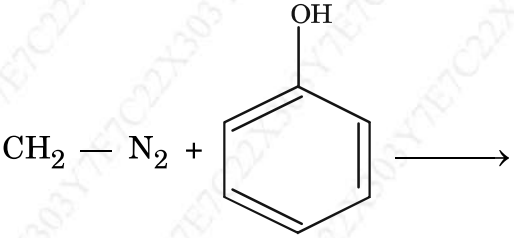
(*d*) Predict the product :

(*i*) 

(*ii*) 

(*iii*) 

(*iv*) 

(*v*) 

This question paper contains **3** printed pages]

PA—23—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(New Couse)

CHEMISTRY

Paper–IX

(Physical and Inorganic Chemistry)

(Friday, 12-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions.

(*ii*) Use of logarithmic table and calculator is allowed.

1. Solve any *three* of the following : 15

(*a*) What are interhalogen compounds ? Explain structure of XY_3 type of interhalogen compound.

(*b*) Write any *two* properties of ICl_2^- ion and explain its structure.

(*c*) Define oxyacids of halogen. Explain its classification.

P.T.O.

(*d*) Write a note on pyrosilicate and orthosilicate.

(*e*) Explain briefly metallic carbide.

2. Solve any *three* of the following : 15

(*a*) Derive equation for rate constant of first order chemical reaction. Show that the half-life period of first order reaction is independent of initial concentration of reaction.

(*b*) For the first order reaction the half-life period is 20 minutes. What is the time taken for 75% of the completion of the reaction ?

(*c*) Explain Arrhenius theory of electrolytic dissociation and give its any *two* limitations.

(*d*) State Kohlrausch's law and explain its any *two* applications.

(*e*) State and explain Grotthus-Drapper law and Stark-Einstein law of photochemical equivalence.

3. Solve any *two* of the following : 10

(*a*) Explain different factors affect the rate of chemical reaction.

(*b*) 0.4 N solution of salt placed between platinum electrods 16 cm apart having 4 cm^2 cross-sectional area has shown the 20 ohm resistance. Find equivalent conductance of the solution.

(*c*) Explain the conductometric titration of strong acid against strong base.

(*d*) Explain the phenomenon of fluorescence and phosphorescence with Jablonski diagram.

This question paper contains **3** printed pages]

PA—253—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(New Course)

INDUSTRIAL CHEMISTRY

Paper–VIII

(Unit Operation–IV)

(Friday, 10-05-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions carry equal marks.

(*ii*) Use of scientific calculator and log table is allowed.

1. Explain size reduction operation and various laws of size reduction and crushing efficiency with mathematical expression. 15

Or

(*a*) Solve the problems : 8

A certain set of crushing rolls of 1000 mm diameter and 375 mm width face. They are set so that the crushing faces are 12.5 mm apart. The manufacturer recommends their speed to be 50 to 100 rpm. They are employed to crush a rock having specific gravity 2.35 and the angle of hip is $31^{\circ}\ 30'$. What is the maximum permissible size of the feed and maximum actual capacity of rolls in tonnes per hour if the actual capacity is 12% of the theoretical ?

P.T.O.

Theoretical capacity in t/h

$Q = 4.352 \times 10^7$ N.D.Wd.S

where N in r.p.m. D (roll diameter) in mm., W width in mm, d (half the gap/width between roll surface) in mm and S is specific gravity.

(*b*) What rotational speed in revolutions per minute would you recommend for a ball mill 1200 mm in diameter charged with 75 mm balls ? 7

2. Explain drying operation in detail and give the construction and working of Rotary Dryer and Tray Dryer with a neat labelled diagram. 15

Or

Solve the problems on :

(*a*) A 100 kg bath of granular solids containing 30% moisture is to be dried in a tray dryer to 16% moisture by passing a current of air at 350 K tangentially across its surface at a given velocity of 1.8 m/s. If the constant rate of drying under these conditions is 0.7×10^{-3} kg/(m^2.s) and the critical moisture content is 15%, calculate the time required for drying the solids. Drying surface = 0.03 m^2/kg dry weight. 8

(*b*) Solids are to be dried under constant drying conditions from 67% to 25% moisture. The value of equilibrium moisture for the material is 1%. If the critical moisture content is 40% and rate of drying in the constant rate period is 1.5 kg/(m^2.h), calculate the drying time. 7

Drying surface = 0.5 m^2/kg dry solid.

3. Write short notes on (any *two*) : 10

(*a*) Short tube evaporator

(*b*) Horizontal tube evaporator

(*c*) Black Jaw crusher

(*d*) Bond's low work index.

This question paper contains **2** printed pages]

PA—283—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

MARCH/APRIL, 2024

(New Course)

INDUSTRIAL CHEMISTRY

Paper : IX

(Pollution Monitoring and Control)

(Monday, 13-05-2023) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— Solve *all* questions.

1. Explain method of sewage treatment. 15

Or

(*a*) Explain pollution caused by various industries. 8

(*b*) Write in detail overall effect on quality of human life and environment. 7

2. What is Biosphere ? Explain protection of Biosphere. 15

Or

(*a*) Explain the method of gas analysis SO_2. 8

(*b*) Write a detailed note on particulate matter. 7

P.T.O.

3. Write short notes on (any *two*) : 10

(*a*) Industrial emission and Air Act

(*b*) Oxides of Nitrogen

(*c*) Sewage and its composition

(*d*) Sludge disposal.

This question paper contains **3** printed pages]

PA—68—2024

FACULTY OF SCIENCE & ARTS

B.A./B.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(New Course)

MATHEMATICS

Paper-IX

(Real Analysis-II)

Saturday, 20-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Attempt *all* questions.

(2) Figures to the right indicate full marks.

1. Prove that a necessary and sufficient condition for the integrability of a bounded function f is that to every $\in > 0$, there corresponds $\delta > 0$ such that for every partition P of $[a, b]$ with norm $\mu(P) < \delta$: 15

$$U(P, f) - L(P, f) < \in$$

Or

(a) Prove that a function f is integrable over $[a, b]$ iff there is a number I lying between L(P, f) & U(P, f) such that for any $\in > 0$, $\exists$ a partition P of $[a, b]$ such that : 8

$$|U(P, f) - I| < \in \text{ and}$$

$$|I - L(P, f)| < \in$$

(b) Prove that every integrable continuous function is integrable. 7

P.T.O.

2. If f and g be two positive function such that $f(x) \leq g(x)$, for all x in $[a, b]$ then : 15

(*i*) $\int_a^b f dx$ converges if $\int_a^b g\,dx$ converges.

(*ii*) $\int_a^b g\,dx$ diverges, and if $\int_a^b f dx$ diverges and also test the convergenic of $\int_0^1 \frac{dx}{\sqrt{1-x^3}}$.

Or

(*a*) If f and g are positive in $[a, x]$ and $\lim_{x\to\infty} \frac{f}{g} = l$, where l is a non-zero finite number, then two integral $\int_a^\infty f\,dx$ and $\int_a^\infty g\,dx$ converge or diverge together. Also if $f/g \to 0$ and $\int_a^\infty g\,dx$ converges then prove that $\int_a^\infty f\,dx$ converges and if $f/g \to \infty$ and $\int_a^\infty g\,dx$ diverges, then $\int_a^\infty f\,dx$ diverges. 8

(*b*) If ϕ is bounded of monotonic in $[a, \infty]$ and $\int_a^\infty f\,dx$ is convergent at ∞, then prove that $\int_a^\infty f\phi\,dx$ is convergent at ∞. 7

3. Atempt any *two* :

(*a*) Show that x^2 is integrable on any interval [0, k]. 5

(*b*) Compute $\int_{-1}^{1} f\,dx$, where $f(x) = |x|$. 5

(*c*) Examine the convergence of $\int_{0}^{1} \frac{dx}{x^2}$. 5

(*d*) Show that $\int_{1}^{\infty} \frac{\sin x}{\rho}\,dx$ converges absolutely if P > 1. 5

This question paper contains **2** printed pages]

PA—81—2024

FACULTY OF SCIENCE

B.Sc. (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

MATHEMATICS

Paper–X

(Ring Theory)

(Tuesday, 23-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Define field, integral domain and show a ring R is without zero divisors if and only if the cancellation laws hold in R. 15

Or

(*a*) Show that an arbitrary intersection of left ideals of a ring is a left ideal of the ring. 8

(*b*) If F is a field, then $F[x_1, x_2, \ldots\ldots\ldots x_n]$ is an integral domain. 7

2. Let F be a field, $f(x)$ and $g(x)$ be any two polynomials in $F[x]$, not both of which are zero. Then $f(x)$ and $g(x)$ have a greatest common divisor $d(x)$ which can be expressed in the form 15

$d(x) = m(x)\, f(x) + n(x)\, g(x)$, for polynomials $m(x)$ and $n(x)$ in $F(x)$.

P.T.O.

Or

(*a*) Show that ring of integers is a principal ideal ring. 8

(*b*) Show that the ring of integers is a Euclidean ring. 7

3. Attempt any *two* of the following : 10

(*a*) If an ideal U of a ring R contains a unit of R, then U = R.

(*b*) Find all units of the integral domain of Gaussian integers.

(*c*) If a, b, c, d are elements of a ring R, then evaluate $(a + b)(c + d)$.

(*d*) Show that the set of matrices $\begin{bmatrix} a & b \\ o & c \end{bmatrix}$ is a subring of the ring 2×2 matrices with integral elements.

This question paper contains **3** printed pages]

PA—94—2024

FACULTY OF SCIENCE

B.Sc. (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

MATHEMATICS

Paper XI

(Partial Differential Equations)

(Monday, 29-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—Two Hours *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. If $P_p + Q_q = R$ is a linear equation in p and q, where P, Q and R being functions of x, y, z, then discuss the method that the equation : 15

$$P\frac{\partial u}{\partial x} + Q\frac{\partial u}{\partial y} + R\frac{\partial u}{\partial z} = 0$$

is equivalent to the form :

$$P_p + Q_q = R$$

Solve :

$$(x^2 - yz)\ p + (y^2 - zx)\ q = z^2 - xy.$$

Or

(*a*) Discuss the method of finding complementary function of homogeneous equation : 8

$$(a_0 D^n + a_1 D^{n-1} D^1 + \ldots\ldots\ldots + a_n D^{1n})\ z = f(x, y).$$

(*b*) Solve : 7

$$p^2 + q^2 = 1.$$

P.T.O.

2. Explain Monge's method for solving the non-linear equation of second order : 15

$$Rr + Ss + Tt = V$$

where R, S, T and V are the functions of x, y, z, p, q and $r = \frac{\partial^2 f}{\partial x^2}$, $s = \frac{\partial^2 f}{\partial x \partial y}$ and $t = \frac{\partial^2 f}{\partial y^2}$.

Solve :

$$r - t + p - q = 0.$$

Or

(*a*) Find the solution of $\frac{\partial^2 u}{\partial x^2} = h^2 \frac{\partial^2 u}{\partial t}$ for which $u(0, t) = u(l, t) = 0$, $u(x, 0) = \sin\frac{\pi x}{l}$ by method of variable separable. 8

(*b*) Derive solution of wave equation :

$$\frac{\partial^2 y}{\partial t^2} = C^2 \frac{\partial^2 y}{\partial x^2}$$

by D'Alembert's method. 7

3. Attempt any *two* of the following : 10

(*a*) Form the partial differential equation by eliminating the arbitrary constants from :

$$z = (x + a)(y + b)$$

(*b*) Solve :

$$\frac{\partial^2 z}{\partial x^2} - 5\frac{\partial^2 z}{\partial x \partial y} + 6\frac{\partial^2 z}{\sigma y^2} = e^{x+y}.$$

(*c*) Obtain the solution of wave equation :

$$\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$$

using the method of separable variable.

(*d*) Solve :

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$$

which satisfies the conditions :

$$u(0, y) = u(l, y) = u(x, 0) = 0$$

and $u(x, a) = \sin \frac{n\pi x}{l}$.

This question paper contains **2** printed pages]

PA—37—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

MARCH/APRIL, 2024

(CBCS/New Pattern)

BOTANY

Paper VIII

(Plant Embryology)

(Monday, 15-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

Note :— (*i*) Attempt *all* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Draw neat and well labelled diagrams wherever necessary.

1. What is fertilization. Give an account of double fertilization. 15

Or

Write in brief on :

(*a*) T.S. of anther. 8

(*b*) Male sterility 7

P.T.O.

2 Define embryo. Describe the development of crucifer type of embryo. 15

Or

Write in brief on :

(*a*) Cleistogamy 8

(*b*) Self-pollination. 7

3. Write short notes on (any *two*) : 10

(*a*) Structure of pollen grain

(*b*) Agents of pollination

(*c*) Orthrotropous ovule

(*d*) Seed dispersal.

This question paper contains **2** printed pages]

PA—52—2024

FACULTY OF SCIENCE

B.A. (Second Year) (Fourth Semester) EXAMINATION

MARCH/APRIL, 2024

(New Course)

BOTANY

Paper–IX

(Plant Metabolism and Biotechnology)

(Thursday, 18-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions.

(*ii*) Figures to the right indicate full marks.

(*iii*) Illustrate your answers with suitable diagram.

1. Describe in detail Kreb's cycle in respiration. 15

Or

(*i*) Explain nomenclature system and classification (IUB) of enzymes. 8

(*ii*) Give an account of nitrification and denitrification in Nitrogen metabolism. 7

P.T.O.

2. What is anther culture ? Describe production of haploids in plant tissue culture. 15

Or

(*i*) Give an account of polymerase chain reaction (PCR) and its application. 8

(*ii*) Explain cDNA Library in genetic engineering. 7

3. Write notes on any *two* of the following : 10

(*i*) Structure of ATP

(*ii*) Nitrogen Cycle

(*iii*) Synthetic Seeds

(*iv*) pBR-322

This question paper contains **2** printed pages]

PA—69—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Fourth Sem.) EXAMINATION

MARCH/APRIL, 2024

(New Pattern)

ZOOLOGY

Paper VIII

(Cell Biology and Genetics)

(Saturday, 20-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

Note :— (*i*) Attempt *all* questions.

(*ii*) Illustrate your answers with suitable and labelled diagrams wherever necessary.

1. Describe the structure of Prokaryotic cell. 15

Or

(*a*) Explain the Mendel's law of independent Assortment. 8

(*b*) Give an account on complementary factor. 7

P.T.O.

2 What is linkage ? Describe the types and significance of linkage. 15

Or

(*a*) Give an account of sex linked inheritance in man with suitable example. 8

(*b*) Give an account on human pedigree analysis with symbols. 7

3. Write short notes on any *two* of the following : 10

(*a*) Endoplasmic reticulum

(*b*) Duplicate gene

(*c*) Significance of crossing over

(*d*) Klinefelter syndrome.

This question paper contains **2** printed pages]

PA—82—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

MARCH/APRIL, 2024

(New Pattern)

ZOOLOGY

Paper IX

(Evolutionary Biology and Genetic Engineering)

(Thursday, 23-04-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

Note :— (*i*) Attempt *all* questions.

(*ii*) Illustrate your answer with suitable labelled diagram, wherever necessary.

1. Describe in detail Neo-Darwinism theory of organic evolution. 15

Or

(*a*) Elaborate biological species concept. 8

(*b*) Explain adaptive radiation in Darwin's finches. 7

P.T.O.

2 Describe structure, types and functions of RNA. 15

Or

(*a*) Explain Northern blotting. 8

(*b*) What is cloning ? Explain its mechanism. 7

3. Attempt any *two* of the following : 10

(*a*) Palaeontological evidences

(*b*) Causes of mass extinction

(*c*) DNA polymerase

(*d*) PCR (Polymerase Chain Reaction).

This question paper contains **2** printed pages]

PA—251—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

FISHERY SCIENCE

Paper–VIII

(Fish Preservation and Fish Byproduct Technology)

(Friday, 10-05-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Illustrate your answer with suitable diagram wherever necessary.

1. Give a detailed account on principles of fish preservation. 15

Or

Write short notes on :

(*a*) Causes of fish spoilage. 8

(*b*) Biochemical composition of fish. 7

P.T.O.

2. Describe in detail different types of fish byproducts. 15

Or

Write short notes on :

(*a*) Food poisoning and allergies from fish food. 8

(*b*) Food poisoning of bacterial origin. 7

3. Write short notes on (any *two*) : 10

(*a*) Spoilage in fishes

(*b*) Test for freshness of fish

(*c*) Isinglass

(*d*) Food poisoning from consumption of poisonous fish.

This question paper contains **2** printed pages]

PA—281—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

MARCH/APRIL, 2024

(New Pattern)

FISHERY SCIENCE

Paper : IX

(Fishing Craft and Gear Technology)

(Monday, 13-05-2023) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Illustrate your answers with suitably labelled diagrams wherever necessary.

1. Describe in detail different material used for manufacture of fishing crafts. 15

Or

Write notes on :

(*a*) Fishing gear accessories 8

(*b*) Rampani net. 7

P.T.O.

2. Describe in detail passive netting with suitable examples of net. 15

Or

Write notes on :

(*a*) Hooks and line fishing 8

(*b*) Use of AC and DC current in Electro fishing. 7

3. Write short notes on any *two* of the following : 10

(*a*) Preservation of Fishing gear (any one method)

(*b*) Drag net

(*c*) Catamaran

(*d*) Ecosounder.

This question paper contains **2** printed pages]

PA—119—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

MICROBIOLOGY

Paper VIII

(Food, Soil Microbiology and Microbial Ecology)

(Thursday, 2-05-2024) **Time : 02.00 p.m. to 4.00 p.m.**

Time—Two Hours *Maximum Marks*—40

Note :— (*i*) Attempt *all* questions.

(*ii*) Draw well labelled diagrams wherever necessary.

1. Represent carbon cycle and take a detailed account of carbon cycle with respect to cellulose mineralization. 15

Or

Write notes on the following :

(*a*) Botulism 8

(*b*) Sources of contamination in food. 7

P.T.O.

2. Represent and describe phosphorus cycle. 15

Or

Write notes on :

(*a*) Biofertilizers 8

(*b*) Rhizosphere. 7

3. Write short notes on (any *two*) : 10

(*a*) Proteolytic spoilage

(*b*) Significance of microorganisms in soil

(*c*) Sulfur oxidation

(*d*) Parasitism.

This question paper contains **2** printed pages]

PA—183—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

MARCH/APRIL, 2024

(New Pattern)

MICROBIOLOGY

Paper-IX

(Medical Microbiology)

(Saturday, 04-05-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—Two Hours *Maximum Marks*—40

Note :— (*i*) Attempt *All* questions.

(*ii*) Represent your answer with suitable diagrams, if necessary.

(*iii*) Answer to the point.

1. Take an account of etiology, pathogenesis and laboratory diagnosis of *Vibrio cholerae*. 15

Or

Write on :

(*a*) Lab diagnosis of Tuberculosis. 8

(*b*) Pathogenesis of *Treponema pallidum*. 7

P.T.O.

2. Discuss in detail pathogenesis and laboratory diagnosis of HIV. 15

Or

Write on :

(*a*) Candidiosis 8

(*b*) Laboratory diagnosis of Malaria. 7

3. Write short notes on (any *two*) : 10

(*a*) Staphylococcal enterotoxin

(*b*) Importance of β-phage in corynebacterium

(*c*) Prophylaxis of hepatitits B

(*d*) Prevention and control of malaria.

This question paper contains **2** printed pages]

PA—120—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

ELECTRONICS

Paper VIII

(Oscillator and Multivibrators)

(Thursday, 2-05-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—Two Hours *Maximum Marks*—40

Note :—Attempt *all* questions.

1. Define positive and negative feedback. Write advantages and disadvantages of negative feedback. 15

Or

(*a*) Draw the circuit diagram of Colpitt's oscillator and explain its working. 8

(*b*) Explain requirements of an oscillator. 7

2. Explain the working of transistorised monostable multivibrator with suitable waveforms. 15

Or

(*a*) Explain exponential sweep circuits. 8

(*b*) Explain boot strap sweep circuit. 7

P.T.O.

3. Write short notes on (any *two*) : 10

(*a*) Gain stability

(*b*) Barkhausen criterion

(*c*) Transistor as a switch

(*d*) Sweep circuit using UJT.

This question paper contains **2** printed pages]

PA—184—2024

FACULTY OF SCIENCE

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

MARCH/APRIL, 2024

ELECTRONICS

Paper IX

(Introduction to Microcontroller Intel 8051)

(Saturday, 04-05-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—Two Hours *Maximum Marks*—40

Note :— (*i*) Attempt *All* questions.

(*ii*) Draw neat and labelled diagrams wherever necessary.

(*iii*) Numbers to the right indicate full marks.

1. Draw block diagram of a typical microcontroller. Write functions of each block. 15

Or

(*a*) Explain direct and immediate modes of addressing of 8051 with suitable example. 8

(*b*) Enlist groups of instructions of 8051. Explain any *one* group with suitable example. 7

P.T.O.

2. Write ALP for 8051 microcontroller : 15

(*i*) to subtract two bytes

(*ii*) to determine 1's complement of a byte.

Explain each with a suitable example of input data.

Or

(*a*) Write names of any *ten* SFRs in 8051. Explain structure and uses of any *one* SFR. 8

(*b*) Explain the Autoreload mode of timer of 8051 microcontroller in detail. 7

3. Write short notes on any *two* : 10

(*a*) Structure of internal RAM of 8051.

(*b*) Explain instruction of MOVX A, @DPTR with suitable example.

(*c*) Write ALP to find 2's complement of a byte and explain with suitable example.

(*d*) Priority structure of interrupts of 8051.

This question paper contains **2** printed pages]

PA—323—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(CBCS/New Pattern)

COMPUTER SCIENCE

Paper–VIII

(Computer Networks)

(Friday, 10-05-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) *All* questions are compulsory.

(*ii*) *All* questions carry equal marks.

1. Explain computer network devices in detail. 15

Or

(*a*) Define computer network. Explain applications of computer network. 7

(*b*) Describe TCP/IP Model. 8

2. Explain types of computer networks. 15

P.T.O.

Or

(*a*) Describe network topologies in detail. 7

(*b*) Explain structure of telephone system. 8

3. Write short notes on any *two* of the following : 10

(*a*) IP prototocol

(*b*) Co-axial cable

(*c*) Wireless transmission

(*d*) Cryptography.

This question paper contains **2** printed pages]

PA—326—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(CBCS/New Pattern)

COMPUTER SCIENCE

Paper–IX

(Programming in Java)

(Monday, 13-05-2024) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Attempt *all* questions.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data, if necessary.

1. Explain Java features. Describe in detail Java program structure. 15

Or

(*a*) Explain Java Data types. 8

(*b*) Write a program in Java to find largest number from three numbers. 7

2. What is constructor ? Explain method overloading with suitable program. 15

P.T.O.

Or

(*a*) Explain extending interface. 8

(*b*) Explain Java API package. 7

3. Write short notes on any *two* of the following : 10

(*a*) WWW

(*b*) JVM

(*c*) Interface variables

(*d*) Final methods.