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

LB—29—2024

FACULTY OF HUMANITIES

B.A./B.Sc./B.Com. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

मराठी (द्वितीय भाषा)

Paper–I

(अक्षरलेणी)

(Thursday, 04-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—50

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

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

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

(*i*) 'ससीक-रक्षण' या लीळेतून श्री चक्रधर स्वामीचे अहिंसेचे विचार स्पष्ट करा.

(*ii*) 'भावी' जीवनाची उभारणी विद्यापीठात होते, या पाठातून डॉ. बाबासाहेब आंबडकरांचे विचार विशद करा.

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

(*i*) माधव जूलियन यांनी आईचे माहात्म्य कसे वर्णिले आहे ? ते लिहा.

(*ii*) 'सूप आणि जातं' या कवितेचा आशय स्पष्ट करा.

P.T.O.

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

(*i*) क्रीडा संस्कृती रुजविण्यासाठी डॉ. नरेंद्र दाभोळकर यांनी मांडलेले विचार स्पष्ट करा.

(*ii*) अनंत फंदी यांनी फटक्यातून समाजाला कोणता उपदेश केला आहे ? ते लिहा.

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

(*i*) शब्दांच्या जाती म्हणजे काय ? ते सांगून नामाचे प्रकार विशद करा.

(*ii*) प्रमाण मराठी लेखनाचे अनुस्वार विषयक नियम लिहा.

5. टिपा लिहा :

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

(*i*) झाडं लावणारा माणूस

(*ii*) आमची आई-साधनाताई.

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

(*ii*) संत सावता माळी

(*ii*) ही पृथ्वी स्त्रीलिंगी आहे.

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

LB—28—2024

FACULTY OF ARTS/COMMERCE/SCIENCE/SOCIAL SCIENCES

B.A./B.Com./B.Sc./BSW/BFA (First Year) (First Semester)

EXAMINATION

APRIL/MAY, 2024

HINDI (Second Language)

Paper–I

(साहित्य भारती)

(Thursday, 04-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—50

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

(*ii*) दाहिनी ओर प्रश्नों के अंक दिये गये हैं।

1. 'ममता' कहानी के 'ममता' का चरित्र-चित्रण कीजिए। 10

अथवा

'ढाई बीघा जमीन' कहानी खेती बेचकर महानगर की ओर भागने वाली नई पीढ़ी को सोचने के लिए मजबूर करती है। स्पष्ट कीजिए।

2. 'सखि, वे मुझसे कह कर जाते' कविता में व्यक्त 'यशोधरा' की मनोदशा का चित्रण कीजिए। 10

अथवा

'गीत नया गाता हूँ' कविता का आशय स्पष्ट कीजिए।

P.T.O.

3. 'सिक्का बदल गया' कहानी की कथावस्तु लिखिए। 10

अथवा

" 'ठाकुर का कुआँ' कहानी में अछूत समस्या और स्त्रियों की दीन-दशा का चित्रण हुआ है।" समझाइए।

4. 'वीरों का कैसा हो वसंत' कविता भारत के इतिहास का गौरव-गान करती है।' स्पष्ट कीजिए। 10

अथवा

'हरी घास पर क्षण भर' कविता की मूल संवेदना लिखिए।

5. टिप्पणी लिखिए : 10

(अ) 'गुलकी बन्नो' कहानी की 'गुलकी'।

अथवा

'प्याला' कविता का आशय।

(ब) आपके महाविद्यालय में सम्पन्न 'स्वतंत्रता दिवस' का वृत्तांत लिखिए।

अथवा

अपने महाविद्यालय में आयोजित 'स्वच्छता अभियान' का वृत्तांत लिखिए।

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

LB—01—2024

FACULTY OF ARTS, COMMERCE AND SCIENCE

B.A/B.Com/B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

ENGLISH (Compulsory)

(AECC–English Communication–I)

(Tuesday, 02-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—50

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Attempt any *four* from the remaining questions (Q. 2, Q. 3, Q. 4, Q. 5, Q. 6, Q. 7)

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

1. Answer the following questions (any *two*) : 10

(*i*) Define Adverb. Discuss the types of Adverb.

(*ii*) Write a note on modal auxillary verbs.

(*iii*) Write an E-mail of invitation to the Police Commissionaire, A'bad for the inauguration of annual social gathering of your college.

(*iv*) Write a job application to the Manager, Maruti Suzuki Pvt. Ltd., Pune for the post of an Accountant.

P.T.O.

2. What, according to Dr. A.P.J. Abdul Kalam, are the duties and responsibilities of the citizens of India ? 10

3. What according to Narayan Murthy, should we learn from the west ? Why ? 10

4. Write in your own words Hamaguchi's efforts to save the villagers from the disastrous Tsunami. 10

5. Describe Livingston's state of mind during his search for his mother. 10

6. Write a critical appreciation of the sonnet 'My Mistress' Eyes are Nothing Like the Sun. 10

7. Discuss 'Bright Star, would I were steadfast as thou art as a Romantic poem. 10

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

PA—25—2024

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

MARCH/APRIL, 2024

(New Course)

PHYSICS

Paper I

(Mechanics and Properties of Matter)

(Saturday, 13-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

Note :—All questions are compulsory.

1. Explain Jaeger's method for determination of surface tension of liquid. 15

Or

(*a*) Explain Kepler's laws of planetory motion. 7

(*b*) Explain work energy theorem. 8

P.T.O.

2 Derive an expression for Poiseuille's equation for the flow of tube. 15

Or

(*a*) Derive an expression for period of torsional pendulum. 7

(*b*) Derive an expression for twisting couple on a cylinder or wire. 8

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

(*a*) Newton's law of gravitation

(*b*) Excess pressure across a spherical drop

(*c*) Streamline flow

(*d*) Bending of beam.

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

PA—40—2024

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

(New Course)

PHYSICS

Paper–II

(Mathematical Methods in Physics)

(Tuesday, 16-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

(*ii*) Non-programmable calculators are allowed.

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

(*iv*) Symbols have their usual meaning.

1. Define vector triple product of three vectors $\vec{A}, \vec{B}$ and $\vec{C}$, prove that : 15

$$\vec{A} \times \vec{B} \times \vec{C} = \vec{B}\,(\vec{A} \cdot \vec{C}) - \vec{C}\,(\vec{A} \cdot \vec{B})$$

P.T.O.

Or

(*a*) Explain multiplication of two complex number by using an Argand diagram. 8

(*b*) Explain properties of Moduli and Arguments of complex number. 7

2. Define Fourier series and evaluate the coefficient α_0, a_n and b_n in Fourier series. 15

Or

(*a*) Explain the term total differentiation. If F = $f(x, y)$. then show that total differential of F is : 8

$$dF = Fx dx + Fy dy.$$

(*b*) Explain chain rule in detail. 7

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

(*a*) Explain addition of two complex numbers.

(*b*) State Gauss's divergence theorem. State Stone's theorem.

(*c*) Explain change of variable from Cartesian to polar form.

(*d*) Find Fourier series for square wave.

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

PA—05—2024

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

(CBCS/New Course)

CHEMISTRY

Paper–I

(Organic and Inorganic Chemistry)

(Saturday, 6-4-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— Attempt *all* questions.

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

   (*a*) Define *p*-block elements. Write their general characteristics.

   (*b*) (*i*) What are noble gases ? Explain clathrate compounds of noble gases.

   (*ii*) Explain structure of XeF_4.

   (*c*) Give factors affecting on ionisation energy. Discuss variation of ionisation energy along a period and in a group.

   (*d*) What is electronegativity ? Discuss factors affecting on it.

   (*e*) Write *two* preparation methods and any *three* properties of XeF_2.

P.T.O.

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

(*a*) Define the following terms :

(*i*) Substrate

(*ii*) Reagent

(*iii*) Carbocation

(*iv*) Carbene

(*v*) Carbanion.

(*b*) How will you prepare :

(*i*) Alkane by hydrolysis of Grignard reagent

(*ii*) Alkane by Kolbe synthesis

(*iii*) 1-Butene from 1-Butyne

(*iv*) 2-Butene from 2-Butanol

(*v*) Ethyne from Iodoform.

(*c*) What is free radical ? Give its structure and stability.

(*d*) What are alkanes ? Explain pyrrolysis reaction with mechanism.

(*e*) Explain mesomeric effect in Aniline and Nitrobenzene.

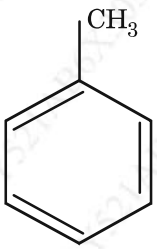
3. Solve any *two* of the following : 10

(*a*) Give the IUPAC names of the following :

(*i*) $CH_3 - CH_2 - CHO$

(*ii*) $CH_3 - \underset{\underset{OH}{|}}{CH} - COOH$

(*iii*) $CH_3 - O - CH_2 - CH_3$

(*iv*) 

(*v*) $CH_3 - \underset{\underset{NH_2}{|}}{CH} - CH_3$

(*b*) What are Cycloalkenes ? How will you prepare Cyclohexene from Cyclohexanol and Bromocyclohexane.

(*c*) Draw the structures of the following compounds :

(*i*) 2, 4 Dimethyl pentane

(*ii*) 2-Bromo propane

(*iii*) 3-Pentanone

(*iv*) Aniline

(*v*) Ethanoyl chloride.

P.T.O.

(*d*) What is the action of the following on 1, 3 Butadiene :

(*i*) Br_2

(*ii*) HBr

(*iii*) $CH_2 = CH_2$.

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

PA—13—2024

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

CHEMISTRY

Paper–II

(Physical and Inorganic Chemistry)

(Wednesday, 10-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

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

(*a*) Explain the basic strength of Hydroxides of alkali and alkaline earth metals.

(*b*) Write a note on formation of complexes of alkali metal with Salicylaldehyde and Acetyl cetone.

P.T.O.

(*c*) Discuss in brief the formation of carbonate and bicarbonate of s-block elements.

(*d*) Define oxidation, reduction, oxidizing agent and reducing agent according to oxidation number concept.

(*e*) Balance the following equation by Ion-electron method :

$$Fe^{2+} + MnO_4^- + H^+ \rightarrow Mn^{2+} + Fe^{3+} + H_2O$$

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

(*a*) Prove that, pH + pOH = 14.

Calculate the pH of 0.025 M. HCl solution.

(*b*) Derive an expression for critical constants in terms of van der Waals constants '*a*' and '*b*'.

(*c*) Discuss the factors affecting adsorption.

(*d*) State and explain the law of rational indices and write a note on 'Miller Indices'.

(*e*) Explain the deviation of real gases from ideal behaviour.

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

(*a*) State and explain the term 'Permutation'. Evaluate $^{16}P_2$.

(*b*) Explain the determination of crystal structure of Potassium chloride (KCl) by Bragg's X-ray diffraction method.

(*c*) What is adsorption isotherm ? Explain Freundlich adsorption isotherm.

(*d*) Calculate the Root Mean Square (RMS) velocity of N_2 and CO_2 molecules at 300 K. (Given : R = 8.314 $JK^{-1}mol^{-1}$)

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

PA—192—2024

FACULTY OF SCIENCE

B.Sc. (First Year) (First Sem.) EXAMINATION

APRIL/MAY, 2024

INDUSTRIAL CHEMISTRY

Paper II

(Material Balance and Process Calculation)

(Thursday, 9-5-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

Note :— (*i*) Solve *all* questions.

(*ii*) Scientific calculator is allowed.

1. What is molecular weight and mole ? 20 gm of caustic soda is dissolved in water to prepare 500 ml solution, find normality and molarity. 15

Or

(*a*) What is weight percent and volume percent ? 8

(*b*) An aqueous solution of sodium chloride is prepared by dissolving 25 kg of sodium chloride in 100 kg of water. 7

Determine :

(*i*) Weight %

(*ii*) Mole % composition of solution.

P.T.O.

2. A feed of continuous fractionating column analyses by weight 28 percent benzene and 72 percent toluene. The analysis of the distillate shows 52 weight % benzene and 5 weight % benzene was found in the bottom product. Calculate the amount of distillate and bottom product per 1000 kg of feed per hour, also calculate the % recovery of benzene. 15

Or

A single effect evaporator is fed with 1000 kg/hr of weak liquor containing 15% caustic soda by weight and is concentrated to get thick liquor containing 40% by weight.

Write down overall material balance and individual material balance of evaporation and solve :

(*a*) kg/hr water evaporated

(*b*) kg/hr thick liquor obtained.

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

(*a*) Unit and conversion

(*b*) Work and energy

(*c*) Stoichiometic equation and coefficient

(*d*) Limiting reactant and excess reactant.

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

PA—54—2024

FACULTY OF SCIENCE/ARTS

B.A./B.Sc. (First Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

MATHEMATICS

Paper–I

(Calculus–I : Differential Calculus)

(Friday, 19-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. State and prove that Leibnitz's theorem for *n*th derivative of the product of two functions. 15

Or

(*a*) Let $f(x + h)$ be a function of h (x being independent of h) which can be expanded in powers of h and the differentiable any number of times, then prove that : 8

$$f(x + h) = f(x) + hf'(x) + \frac{h^2}{2!} f'(x) + \ldots\ldots\ldots\ldots$$

$$+ \ldots\ldots\ldots\ldots + \frac{h^n}{n!} f^n(x) + \ldots\ldots\ldots$$

P.T.O.

(*b*) If the relation between subnormal SN and subtangent ST at any point S on the curve : 7

$by^2 = (x + a)^3$ is

$\lambda(SN) = \mu\ (ST)^2$, then find the value of $\frac{\lambda}{\mu}$

2. State and prove that Euler's theorem on homogenous function. Also show that : 15

$$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + \frac{1}{4}\sin 2u = 0$$

if $U = \cot^{-1}\frac{x + y}{\sqrt{x} + \sqrt{y}}$.

Or

(*a*) State and prove Rolle's theorem. 8

(*b*) If $f(x) = (x - 1)(x - 2)(x - 3)$, $x \in [0, 4]$, then find **C** by using Lagrange's mean value theorem. 7

3. Answer the following (any *two*) : 5 each

(*a*) If $x = a(\cos\theta + \theta \sin\theta)$, $y = a(\sin\theta - \theta\cos\theta)$, then find $\frac{d^2y}{dx^2}$.

(*b*) Expand $\cos x$ by Maclaurin's series.

(*c*) Using Lagrange's mean value theorem, show that :

$$\frac{x}{1+x} < \log(1+x) < x,\ x > 0.$$

(*d*) If $z = \log(x^2 + y^2)$, then show that :

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

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

PA—70—2024

FACULTY OF SCIENCE AND ARTS

B.Sc./B.A. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

(New Course)

MATHEMATICS

Paper-II

(Algebra and Trignometry)

(Monday, 22-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

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

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

1. (A) (*i*) Prove that the necessary and sufficient condition for a square matrix A to possess the inverse is that $|A| \neq 0$ (i.e. A is non-singular). 8

(*ii*) Find the adjoint of matrix : 7

$$\begin{bmatrix} 2 & 1 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}$$

and verify the theorem A(adj A) = (adj A) A = $|A|\ I_n$.

Or

(B) Prove that, the elementary operations do not alter the rank of a matrix. 8

(C) Reduce to row reduced echelon form of the matrix : 7

$$A = \begin{bmatrix} 0 & 1 & 3 & -1 & 4 \\ 2 & 0 & -4 & 1 & 2 \\ 1 & 4 & 2 & 0 & -1 \\ 3 & 4 & -2 & 1 & 1 \\ 6 & 9 & -1 & 1 & 6 \end{bmatrix}.$$

P.T.O.

2. (A) (*i*) Prove that a system AX = B of n non-homogeneous equations in n unknown has a unique solution provided A is non-singular, i.e. $\rho(A) = n$. 8

(*ii*) For what value of λ, the system 7

$$\begin{bmatrix} 1 & 2 \\ 3 & \lambda \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$$

has (*i*) no solution (*i*) unique solution (*iii*) more than one solution.

Or

(B) For an even integer n, express $\sin^n \theta$ in a series of cosines of multiples of θ. 8

(C) Simplify : 7

$$\frac{(\cos 3\theta + i \sin 3\theta)^5 (\cos \theta - i \sin \theta)^3}{(\cos 5\theta + i \sin 5\theta)^7 (\cos 2\theta - i \sin 2\theta)^5}.$$

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

(*i*) Express the quantity $-1+\sqrt{-3}$ in the form $r(\cos \theta + \sqrt{-1} \sin \theta)$.

(*ii*) Calculate the adjoint of the diagonal matrix :

$$A = \begin{bmatrix} d_1 & 0 & 0 \\ 0 & d_2 & 0 \\ 0 & 0 & d_3 \end{bmatrix}.$$

(*iii*) Find the rank of the matrix :

$$A = \begin{bmatrix} 1 & 2 & -1 & 4 \\ 2 & 4 & 3 & 5 \\ -1 & -2 & 6 & -7 \end{bmatrix}$$

using elementary row operations.

(*iv*) Examine the consistency of the following equations and if consistent, find the complete solution :

$$x + y + z = 3$$
$$x + 2y + 3z = 14$$
$$x + 4y + 7z = 30.$$

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

PA—24—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (First Year) (First Semester) EXAMINATION

MARCH/APRIL, 2024

(New Course)

BOTANY

Paper I

(Viruses, Bacteria, Algae, Fungi, Lichens and Mycorrhiza)

(Saturday, 13-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Explain in detail asexual reproduction by the formation of unilocular and plurilocular sporangia in Ectocarpus. 15

Or

Write in brief :

(*a*) General characters of viruses. 8

(*b*) Economic importance of bacteria. 7

P.T.O.

2 Write an account of asexual and sexual reproduction in penicillium. 15

Or

Explain in brief :

(*a*) General characters of Lichens. 8

(*b*) Ecto and Endomycorrhiza. 7

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

(*a*) Yellow vein mosaic of Bhendi

(*b*) Thallus structure of Oedogonium

(*c*) External structure of Basidiocarp

(*d*) Types of Lichens.

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

PA—39—2024

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

MARCH/APRIL, 2024

(New Pattern)

BOTANY

Paper II

(Plant Ecology, Phytogeography and Environmental Biology)

(Tuesday, 16-4-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. What is ecological factors ? Describe light and temperature as an ecological factors. 15

Or

Describe in brief :

(*a*) General characters of Halophytes. 8

(*b*) Anatomical adaptations in hydrophytes. 7

P.T.O.

2 What is ecosystem ? Describe the components and functions in pond ecosystem. 15

Or

Write notes on :

(*a*) Causes and control measures of water pollution. 8

(*b*) Chipko movement. 7

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

(*a*) Soil pH

(*b*) Anatomical adaptations in xerophytes

(*c*) Energy pyramid

(*d*) Deforestation.

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

PA—55—2024

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

MARCH/APRIL, 2024

ZOOLOGY

(New Pattern)

Paper–I

(Biodiversity of Invertebrate–I)

(Friday, 19-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Explain in detail account of life cycle, pathogenicity and control measures of Ascaris lumbricoides. 15

Or

(*i*) General characters of Porifera. 8

(*ii*) Explain locomotory organ in Protozoa. 7

P.T.O.

2. Explain in detail respiratory system of cockroach. 15

Or

(*a*) Describe general characters of Mollusca. 8

(*b*) Add a note on external morphology of starfish. 7

3. Write short notes on (any *two*) : 5+5

(*a*) Describe pathogenicity and control measures of Plasmodium vivax.

(*b*) Structure of Taenia solium

(*c*) Vermicomposting

(*d*) General characters of hemichordata.

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

PA—71—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (First Semester) EXAMINATION

MARCH/APRIL, 2024

ZOOLOGY

Paper II

(Biodiversity of Chordata)

(Monday, 22-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Describe in detail respiratory system in scoliodon. 15

Or

(*a*) General character of urochordata. 8

(*b*) Parental care in Amphibia. 7

2 Describe in detail nervous system in Rat. 15

Or

(*a*) General character of Reptilia. 8

(*b*) Migration in birds. 7

P.T.O.

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

(*a*) Scroll valve

(*b*) Poisnous snake

(*c*) Aestivation in frog

(*d*) Spinal cord.

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

PA—83—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (First Year) (First Semester) EXAMINATION

MARCH/APRIL, 2024

(New Pattern)

MICROBIOLOGY

Paper I

(Introductory Microbiology)

(Wednesday, 24-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

Note :— (*i*) *All* questions are compulsory.

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

1. Explain in detail beneficial and harmful role of microorganisms in human and animal health. 15

Or

Write notes on :

(*a*) Contribution of Louis Pasteur. 8

(*b*) Early observation of microorganisms. 7

P.T.O.

2 Explain in detail general characteristics of Protozoa. 15

Or

Write notes on :

(*a*) Taxonomic groups. 8

(*b*) Genetic relatedness. 7

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

(*a*) Types of microorganisms

(*b*) Robert Koch

(*c*) General characteristics of viruses

(*d*) Nomenclature of bacteria.

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

PA—84—2024

FACULTY OF SCIENCE

B.Sc. (First Semester) EXAMINATION

MARCH/APRIL, 2024

ELECTRONICS

Paper I

(Basic Electronics and Network Analysis)

(Wednesday, 24-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. What is series and parallel circuit ? Determine proportional voltage formula and proportional current formula. 15

Or

(*a*) State and explain Norton's theorem. 7

(*b*) State and explain maximum power transfer theorem. 8

P.T.O.

2 Explain series RLC circuit, resonance and bandwidth of RLC circuit. 15

Or

(*a*) Explain significance of operator j. 7

(*b*) Find sum and difference of the given two vectors : 8

$$E_1 = \hat{}_1 + jb_1 \text{ and } E_2 = q_2 + jb_2$$

3. Attempt any *two* : 10

(*a*) State Kirchhoff's current and voltage law

(*b*) Ideal constant voltage source

(*c*) Two vectors are given :

$$\vec{A} = 5\angle 30° \text{ and } \vec{B} = 3\angle 25°$$

Find :

$$\vec{A} \times \vec{B} \text{ and } \frac{\vec{A}}{\vec{B}}$$

(*d*) Resonance in parallel RLC circuit.

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

PA—96—2024

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

MARCH/APRIL, 2024

ELECTRONICS

Paper II

(Basic Digital Electronics)

(Tuesday, 30-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Explain NAND and X-OR gates with its symbol, truth table and Boolean expression. Draw logic circuit of NAND and X-OR gates using basic gates. 15

Or

(*a*) Perform the following conversions : 8

(*i*) $(DA)_{16} = (?)_{10}$

P.T.O.

(*ii*) $(11001)_{gray} = (?)_2$

(*iii*) $(217)_8 = (?)_2$

(*iv*) $(128)_{10} = (?)_{16}$

(*b*) Explain binary substraction using 1's complement method for the following binary numbers : 7

(*i*) 1011 – 1010

(*ii*) 1001 – 1011

2. Write various laws of Boolean algebra : 15

(*i*) AND laws

(*ii*) OR laws

(*iii*) Commutative laws

(*iv*) Associative laws

(*v*) Distributive laws

Prove the following Boolean expression using laws and identities for Boolean algebra :

$$A + \overline{B}C\,(A + \overline{\overline{B}C}) = A$$

Or

(*a*) Explain half substractor. Give its truth table and implement it using suitable gates. 8

(*b*) Explain full substractor with two half substractor. Give its truth table. 7

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

(*a*) Universal property of NOR gate

(*b*) ASCII code

(*c*) POS form of Boolean expression

(*d*) Parallel binary adder.

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

PA—316—2024

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

COMPUTER SCIENCE

Paper–I

(Programming Logic Concepts)

(Friday, 03-05-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. *:—* (*i*) Assume suitable data, if necessary.

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

1. Explain in detail Binary search technique with its algorithm. 15

Or

(*a*) Write an algorithm to exchange the values of two variables. 8

(*b*) What is flow chart ? Explain symbols used in flow chart. 7

P.T.O.

2. Draw and explain architecture of computer with brief description about ALU, CU and I/O devices. 15

Or

(*a*) Write an algorithm to find smallest divisor of an integer. 8

(*b*) Explain the concept of top down design. 7

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

(*a*) Main memory

(*b*) Efficiency of algorithm

(*c*) Applications of computer

(*d*) Array.

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

PA—324—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

COMPUTER SCIENCE

Paper–II

(Designing of Web Pages Using HTML)

(Thursday, 09-05-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Discuss the objectives of the website and explain the concept of story board. Also explain various navigations and links within the site. 15

Or

(*a*) Write a HTML program to create the three horizontal frames and in these frames, each frame should display a website (*e.g.* Frame 1–Youtube, Frame 2–FlipKart, Frame–3–Google) 8

(*b*) Explain the concept of row span and column span of table in HTML. 7

P.T.O.

2. Explain with suitable examples text formatting of text alignment in HTML. 15

Or

(*a*) Explain with suitable example form designing in HTML. 8

(*b*) Explain video file formats. 7

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

(*a*) Importance of the Internet

(*b*) Lists in HTML

(*c*) Images in HTML pages

(*d*) CGI Scripting.

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

PA—190—2024

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

FISHERY SCIENCE

Paper II

(Type Study : Wallago Attu Fresh Water Shark)

(Thursday, 9-5-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

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

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

1. Describe external characters of Wallago attu. 15

Or

Write notes on :

(*a*) Coelom and alimentary canal. 8

(*b*) Physiology of respiration. 7

P.T.O.

2. Write in detail male reproductive system. 15

Or

Write notes on :

(*a*) Arterial system 8

(*b*) Composition of blood. 7

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

(*a*) Weberian ossicles

(*b*) Structure of gill

(*c*) Spinal nerves

(*d*) Spawning habit of Wallago attu.

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

LB—44—2024

FACULTY OF ARTS/SCIENCE/COMMERCE

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

APRIL/MAY, 2024

MARATHI (Second Language)

Paper–II

(साहित्य शिल्प)

(Friday, 05-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—50

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

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

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

(*i*) 'राग' या पाठातून कैलास सत्यार्थी यांनी लहान मुळांविषयीचे कोणते स्वप्न पाहिले आहे, ते लिहा.

(*ii*) 'चांदणभूल' या पाठातून आढवणीतील गाव व बदलता गावगाडा यांचा वेध कसा घेतला आहे, ते सांगा.

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

(*i*) 'तिच्या मनात उतरणे' या कवितेतून स्त्रीला भोगाण्या लागणाऱ्या दु:खाची संयत अभिव्यक्ती कशी व्यक्त झाली आहे, ते विशद करा.

P.T.O.

(*ii*) 'वासनेची मगरमिठी' या कवितेतून जागतिकीकरण व बदलता समाज या विषयीच्या जाणिवा कशा व्यक्त झाल्या आहेत, ते लिहा.

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

(*i*) प्रयोग म्हणजे काय ? ते सांगून कर्तरी प्रयोगाचे प्रकार सांगा.

(*ii*) मराठी साहित्य महामंडळाने सांगीतलेले ऱ्हस्व दीर्घासंबंधीचे नियम सांगा.

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

(*i*) 'झेल्या' या कथेचा आशय तुमच्या शब्दात लिहा.

(*ii*) 'जीवनी' या कवितेतून निसर्ग आणि समाज यांचा वेध कसा घेण्यात आला आहे, ते लिहा.

5. टिपा लिहा :

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

(*i*) भावे प्रयोग

(*ii*) 'ईद' कथेतील धार्मिक सामंजस्य.

(आ) खालील दोहोंपैकी कोणतीही **एक** टीप लिहा : 5

(*i*) 'डॉ. बाबासाहेब आंबेडकर' या कवितेचा आशय

(*ii*) कर्मभाव संकर प्रयोग.

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

LB—43—2024

FACULTY OF HUMANITIES

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

APRIL/MAY, 2024

हिन्दी (द्वितीय भाषा)

Paper–II

(साहित्य भारती)

(Friday, 05-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—50

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

(*ii*) **सभी** प्रश्नों को समान अंक दिए गए हैं।

1. 'हत्या' कहानी वर्तमान वैश्वीकरण, महंगाई के युग में किसान की त्रासदी का यथार्थ वर्णन है। स्पष्ट कीजिए। 10

अथवा

'उसने तो नहीं कहा था' कहानी की कथावस्तु लिखिए।

2. 'यह वह भारतवर्ष नहीं है।' कविता में भारतीय संस्कृति का गौरव अभिव्यक्त हुआ है। समझाइए। 10

अथवा

'सपना' कविता में व्यक्त समतामूलक समाज का विवेचन कीजिए।

P.T.O.

3. 'आशीर्वाद' कहानी का आशय लिखिए। 10

अथवा

'बेठन' कहानी की मूल संवेदना लिखिए।

4. जहीर कुरेशी की गजलों का सारांश अपने शब्दों में लिखिए। 10

अथवा

'माँ के लिए ससुराल जाने से पहले' कविता में व्यक्त भाव को समझाइए।

5. टिप्पणी लिखिए :

(अ) 'मंडन मिसिर की खुरपी' कहानी में वृद्धों के प्रति संवेदना। 5

अथवा

'चुनाव' कविता का आशय संक्षेप में लिखिए।

(ब) पारिवारिक पत्र का स्वरूप। 5

अथवा

आवेदन पत्र का प्रारूप।

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

LB—19—2024

FACULTY OF ARTS, COMMERCE AND SCIENCE

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

APRIL/MAY, 2024

ENGLISH (Compulsory)

Paper–II

(AECC–English Communication)

(Wednesday, 03-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—50

N.B. *:—* (*i*) Q. No. 1 is compulsory.

(*ii*) Attempt any *four* from the remaining questions.

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

1. Attempt answers to the following questions (any *two*) : 10

(*i*) Discuss the functions and uses of simple past tense.

(*ii*) Explain the concept of aspect in tense.

(*iii*) Write a report on the dazzling performance of your college team in intercollegiate youth festival Dnyantirth-23.

P.T.O.

(*iv*) Prepare a news report on a devastating situation caused by flood in your region.

2. How, according to Dr. B. R. Ambedkar, would challenging the authority of shastras help to destroy the caste in India ? 10

3. How does A.G. Gardiner underline the importance of law and order in society ? 10

4. The story 'An Astrologer's Day' highlights the role of chances and coincidences in life ? Discuss. 10

5. How does Charlie Chaplin narrate the story about the accidental discovery of child artist ? 10

6. Comment on the essence of the strange relationship between the poet and the dog. 10

7. Attempt a critical appreciation of the poem 'A Posion Tree'. 10

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

PA—31—2024

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2024

(New Pattern)

PHYSICS

Paper III

(Heat and Thermodynamics)

(Monday, 15-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

Note :—All questions are compulsory.

1. Explain in detail Maxwell's thermodynamic relations. 15

Or

(*a*) What is difference between Centigrade and Fahrenheit scale. 8

(*b*) Explain Andrews experiment on CO_2. 7

2 Define transports phenomena. Give the interrelation between three transport coefficients. 15

P.T.O.

Or

(*a*) Describe platinum resistance thermometer. 8

(*b*) Derive van der Waal's equation of state. 7

3. Write short notes on any *two* (each of 5 marks) : 10

(*a*) Gas thermometer

(*b*) Temperature of inversion

(*c*) Internal energy

(*d*) Thermal conductivity of gas.

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

PA—49—2024

FACULTY OF SCIENCE

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

MARCH/APRIL, 2024

(New Course)

PHYSICS

Paper–IV

(Electricity and Magnetism)

(Thursday, 18-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Give principle, construction of moving coil type Ballastic galvanometer and deduce the relation between charge (q) and deflection (a). 15

Or

(a) Discuss self-inductance with self inductance of a solenoid. 8

(b) State Ampere's circuital law and deduce its differential form. 7

P.T.O.

2. Explain principle, working and types of transformer with figures. 15

Or

(*a*) Define Biot and Savart law and explain its application to circular coil of its centre. 8

(*b*) Derive an expression for mutual inductance of a pair of coil. 7

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

(*a*) Hysteresis curve

(*b*) Power in A.C. circuit

(*c*) A.C. bridge (Wheatstone bridge)

(*d*) Maxwell's displacement current.

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

PA—09—2024

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2024

(New Pattern)

CHEMISTRY

Paper–III

(Organic and Inorganic Chemistry)

(Monday, 8-4-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— Attempt *all* questions.

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

   (*a*) Explain the following properties of *p*-block elements :

   (*i*) Ionization energy

   (*ii*) Electron affinity.

   (*b*) Explain the variations in the following properties of *p*-block elements :

   (*i*) Atomic radius

   (*ii*) Melting point and boiling point.

   (*c*) Define acids and bases according to solvent system concept and Lux-Flood concept with a suitable example.

P.T.O.

(*d*) Explain the following concepts of acids and bases with suitable examples :

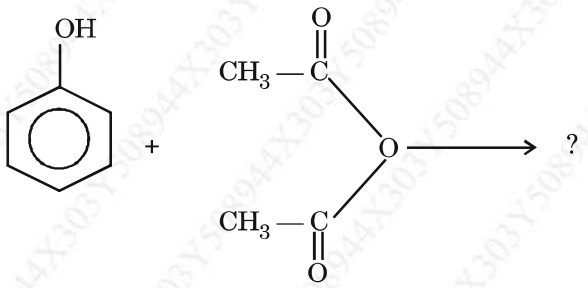
(*i*) Lewis concept

(*ii*) Arrhenius concept.

(*e*) State and explain SHAB principle. Give its limitations.

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

(*a*) Predict the product of the following reactions :

(*i*) 

(*ii*) $CH_3-\overset{\overset{O}{\|}}{C}-Cl + CH_3 \longrightarrow ?$

(*iii*) $CH_2 = CH - CH_2 - I \xrightarrow{KCN} ?$

(*iv*) $2\ CH_2 = CH_2 + O_2 \xrightarrow[250\,^\circ C]{Ag} ?$

(*v*) $CH_3-\overset{\overset{O}{\|}}{C}-OH + CH_3-CH_2-OH \xrightarrow{H_2SO_4} ?$

(*b*) State Huckel rule. Explain aromaticity of the following compounds :

(*i*) Pyridine

(*ii*) Naphthalene.

(*c*) Explain Fries rearrangement reaction with mechanism.

(*d*) Explain Ullmann biphenyl synthesis with mechanism.

(*e*) What are alcohols ? Give its classification.

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

(*a*) Explain the Friedel Craft acylation reaction of benzene with mechanism.

(*b*) Write the notes on the following :

(*i*) Hunsdiecker reaction

(*ii*) Gattermann reaction.

(*c*) (1) What is the action of the following on acetic anhydride :

(*i*) H_2O

(*ii*) $CH_3 — NH_2$

(*iii*) $CH_3 — CH_2 — OH$.

(2) How will you convert ?

(*i*) Acetamide to acetic acid

(*ii*) Acetic acid to acetyl chloride.

(*d*) Give Kekule's structure of benzene. Explain chlorination reaction of benzene with mechanism.

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

PA—20—2024

FACULTY OF SCIENCE

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

MARCH/APRIL, 2024

(New Course)

CHEMISTRY

Paper–IV

(Physical and Inorganic Chemistry)

(Friday, 12-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

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

(*a*) Define polarising power and polarisability of ion. Exlain Fajan's rule.

(*b*) Define hydrogen bonding ? Explain its types with suitable examples.

(*c*) Define sigma and pi bond with examples. Give limitations of VBT of covalent bonding.

P.T.O.

(*d*) Give the basic principle of molecular orbital theory and draw molecular orbital diagram of helium.

(*e*) Explain geometry and bond angle in ammonia and water molecule by VSEPR theory.

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

(*a*) What are gels ? Give its properties.

(*b*) What is catalysis ? Explain homogeneous and heterogeneous catalysis with example.

(*c*) Derive an expression for energy of electron in Hydrogen atom ?

(*d*) What is viscosity ? How will you determine the viscosity of a liquid by Ostwald's viscometer method ?

(*e*) (*i*) Write a note on catalytic poisoning ?

(*ii*) Explain the Hund's rule of maximum multiplicity ?

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

(*a*) What is enzyme catalysis ? Give its characteristics.

(*b*) Define sols ? Explain the optical properties of sols.

(*c*) In the determination of surface tension of a liquid by the drop number method, it gives 59 drops while water gave 28 drops for the same volume. The densities of the liquid and water are 0.996 and 0.800 g/cm^3 respectively. Find the surface tension of the liquid.

(*d*) (*i*) Calculate the radius of second Bohr's orbit of H-atom.

(*ii*) Write a note on quantum numbers.

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

PA—218—2024

FACULTY OF SCIENCE

B.Sc. (Second Semester) EXAMINATION

APRIL/MAY, 2024

INDUSTRIAL CHEMISTRY

Paper-IV

(Energy Balance and Process Calculation)

(Friday, 10-05-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) Solve *all* questions.

(2) Scientific calculator is allowed.

1. A stream of CO_2 flowing at rate of 100 Kmol/min is heated from 298 K (25°C) to 388 K (110°C). Calculate the heat that must be transferred using C_P^0 Data $C_P^0 = a + bT + CT^2 + dT^3$, kJ/(k mol.k) : 15

Gas	a	$b \times 10^3$	$c \times 10^6$	$d \times 10^9$
CO_2	21.3655	11.7551	–2.3426	–0.5623

Or

Define heat capacity and derive relation between C_P and C_V for an ideal gas. 15

2. (*a*) Explain proximate analysis of coal. 8

(*b*) Explain dissolved oxygen. 7

P.T.O.

Or

A dryer is used to dry 100 kg/h wet solids for 20% to 1% moisture by weight by hot air. The fresh air containing 0.02 kg water vapour per kg dry air is available at 303 k (30°C) and 101.325 kPa. Air leaving the dryer is found to contain 0.1 kg water. The vapour per kg dry air if the recycle ratio is maintained at 3 kg dry air in a recycle air per kg dry air in a fresh air. Calculate the volumetric flow rate of fresh air assuming the molecular weight of fresh air to be 28.8. 15

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

(*a*) Purging operation

(*b*) LPG

(*c*) Acidity and alkalinity

(*d*) Various forms of energy.

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

PA—61—2024

FACULTY OF SCIENCE/ARTS

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

APRIL/MAY, 2024

MATHEMATICS

Paper III

(Calculus–II)

(Saturday, 20-4-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

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

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

1. Prove that : 15

$$\int x^m(a+bx^n)^p dx = \frac{x^{m+1}(a+bx^n)^p}{np+m+1} + \frac{apn}{np+m+1}\int x^m(a+bx^n)^{p-1}dx .$$

Or

(*a*) Integrate : 8

$$\frac{Lx+M}{(Ax^2+2Bx+C)^n},$$

where n is a positive integer different from 1.

(*b*) Integrate : 7

$$\frac{dy}{(y^2+1)^2}.$$

P.T.O.

2. Prove that reduction formula : 15

$$\int \sin^m x \cos^n x \, dx = \frac{-\sin^{m-1} x . \cos^{n+1} x}{m+n} + \frac{m-1}{m+n} \int \sin^{m-2} x . \cos^n x \, dx .$$

Or

(*a*) Prove that : 8

$$\beta(m, n) = \frac{\lceil m . \lceil n}{\lceil m+n}.$$

(*b*) Evaluate : 7

$$\int_0^a \int_0^b (x^2 + y^2) \, dx \, dy .$$

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

(*a*) Evaluate :

$$\int \frac{1}{x^2 + 3x + 4} \, dx .$$

(*b*) Integrate :

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

(*c*) Prove that :

$$\int_0^{2a} f(x) \, dx = \begin{cases} 2\int_0^a f(x), & \text{if } f(2a-x) = f(x) \\ 0, & \text{if } f(2a-x) = -f(x) \end{cases} .$$

(*d*) Prove that :

$$\lceil \tfrac{1}{2} = \sqrt{\pi} .$$

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

PA—76—2024

FACULTY OF SCIENCE

B.Sc. (Second Semester) EXAMINATION

APRIL/MAY, 2024

(New Pattern)

MATHEMATICS

Paper IV

(Geometry)

(Tuesday, 23-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

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

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

1. If l, m, n are the direction cosines of a line, then show that : 15

$$l^2 + m^2 + n^2 = 1$$

Also, if α, β, γ be the angles which a line makes with the positive direction of the axes, then prove that :

$$\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma = 2.$$

P.T.O.

Or

(*a*) Show that every equation of the first degree in x, y, z represent a plane. 8

(*b*) Find the equation of the plane through the points : 7

P(2, 2, –1), Q(3, 4, 2), R(7, 0, 6).

2. To find the equations of the line passing through a given point $A(x_1, y_1, z_1)$ and having direction cosines l, m, n. Also find the co-ordinates of the point of intersection of the line : 15

$$\frac{x+1}{1} = \frac{y+3}{3} = \frac{z-2}{-2}$$

with the plane :

$$3x + 4y + 5z = 5.$$

Or

(*a*) To find the equation of the sphere described on the segment joining the points : 8

$$A(x_1, y_1, z_1), B(x_2, y_2, z_2)$$

as a diameter.

(*b*) Find the equation of the cone whose vertex is (α, β, γ) and base : 7

$$ax^2 + by^2 = 1, \quad z = 0.$$

3. Attempt any two of the following : 10

(*a*) If 6, 2, 3 are direction ratios of a line. What are the direction cosines ?

(*b*) Find the angle between the planes :

$$2x - y + z = 6;\ x + y + 2z = 7$$

(*c*) Show that the line :

$$\frac{1}{3}(x - 2) = \frac{1}{4}(y - 3) = \frac{1}{5}(z - 4)$$

is parallel to the plane :

$$2x + y - 2z = 3\,.$$

(*d*) Find the radius and centre of the sphere :

$$x^2 + y^2 + z^2 - 2x + 4y - 6z = 2\,.$$

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

PA—30—2024

FACULTY OF SCIENCE AND TECHNOLOGY

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

MARCH/APRIL, 2024

(New Pattern)

BOTANY

Paper III

(Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)

(Monday, 15-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Describe external morphology of Funaria. Add a note on sex organs in Funaria. 15

Or

Write in brief :

(*a*) External and internal structure of lycopodium strobilus. 8

(*b*) External morphology of Marsilea. 7

P.T.O.

2 Describe external morphology of Pinus. Add a note on T.S. of pinus needle. 15

Or

Write in brief :

(*a*) L.S. of cycas ovule. 8

(*b*) Types of fossils. 7

3. Write short notes on any *two* of the following (each of **5** marks) : 10

(*a*) Classification of bryophytes as per N.S. Parihar

(*b*) Sporocarp of Marsilea

(*c*) General characters of Gymnosperms

(*d*) Lyginopteris oldhamia stem.

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

PA—48—2024

FACULTY OF SCIENCE

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

APRIL/MAY, 2024

(New Pattern)

BOTANY

Paper–IV

(Taxonomy of Angiosperms)

(Thursday, 18-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Describe salient features of Bentham and Hooker's system of classification. Add a note on its merits and demerits. 15

Or

Describe in brief :

(*a*) Binomial nomenclature 8

(*b*) Botanical gardens in India 7

P.T.O.

2. Describe the vegetative and floral characters of family Lamiaceae. Give its floral formula and floral diagram. 15

Or

Describe in brief :

(*a*) Types of placentation 8

(*b*) Types of fruits 7

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

(*a*) Aims of Taxonomy

(*b*) Artificial system of classification

(*c*) Compound leaf

(*d*) Flower of Brassicaceae.

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

PA—62—2024

FACULTY OF SCIENCE

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

APRIL/MAY, 2024

(New Course)

ZOOLOGY

Paper III

(Comparative Anatomy of Vertebrates)

(Saturday, 20-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Give an account of different respiratory organs in vertebrates. 15

Or

Write short notes on :

(*a*) General characters of vertebrates. 8

(*b*) General structure of Integument. 7

2. Give an account of evolution of heart in vertebrates. 15

P.T.O.

Or

Write short notes on :

(*a*) Structure of neuron 8

(*b*) Photoreceptors. 7

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

(*a*) Forelimbs of mammals

(*b*) Degestive glands

(*c*) Single circulation

(*d*) Brain of reptiles.

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

PA—77—2024

FACULTY OF SCIENCE AND TECHNOLOGY

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

MARCH/APRIL, 2024

(New Pattern)

ZOOLOGY

Paper IV

(Developmental Biology of Vertebrates)

(Thursday, 23-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Give an account of types of Eggs on the bases of amount and distribution of yolk. 15

Or

(*a*) Explain the formation of three germinal layers in frog embryo. 8

(*b*) Describe the structure of sperm of frog. 7

P.T.O.

2 Describe in brief any *three* assisted reproductive techniques. 15

Or

(*a*) Describe the structure of Amnion in chick. 8

(*b*) Describe the functions of Placenta. 7

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

(*a*) Spermiogenesis

(*b*) Blastula of Frog

(*c*) Yolk sac in chick

(*d*) Artificial Parthenogenesis.

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

PA—90—2024

FACULTY OF SCIENCE AND TECHNOLOGY

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

MARCH/APRIL, 2024

MICROBIOLOGY

Paper III

(Basic Microbiology and Biomolecules)

(Monday, 29-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

Note :— (*i*) *All* questions are compulsory.

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

1. Explain in detail multiplication of virulent phages by Lytic cycle. 15

Or

Write on :

(*a*) Principle, mechanism, procedure and observations of negative staining. 8

(*b*) Mechanism and procedure of PHB staining. 7

P.T.O.

2. Explain structural and functional properties of RNA. 15

Or

Write on :

(*a*) Classification of carbohydrates with suitable examples. 8

(*b*) Types of lipids with suitable example. 7

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

(*a*) Significance of proteins

(*b*) Milk sugar

(*c*) Structure of HIV

(*d*) Auxochrome and chromophores.

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

PA—113—2024

FACULTY OF SCIENCE

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

APRIL/MAY, 2024

MICROBIOLOGY

Paper IV

(Microbial Physiology)

(Thursday, 2-05-2024) **Time : 10.00 a.m. to 12.00 noon**

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. Define pure culture. Illustrate streak plate technique for isolation of bacteria. 15

Or

Write on :

(*a*) Active transport 8

(*b*) Passive diffusion. 7

P.T.O.

2. What is growth curve ? Discuss different phases of growth in bacteria. 15

Or

Write on :

(*a*) Structure of Endospore.

(*b*) Germination of Endospore.

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

(*a*) Transport medium

(*b*) Facilitated diffusion

(*c*) Chemostat

(*d*) Calcium dipicolinate.

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

PA—91—2024

FACULTY OF SCIENCE

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

MARCH/APRIL, 2024

ELECTRONICS

Paper III

(Semiconductor Devices and Electronic Instrumentaion)

(Monday, 29-04-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Explain construction and working of LED and Photodiode. 15

Or

(*a*) Explain FF, RR and FR biasing of a transistor. 8

(*b*) Define α_{dc} and β_{dc} of a transistor and derive their relationship. 7

2. Explain full wave rectifier with neat circuit diagram. 15

Or

(*a*) Explain various controls of CRO. 8

(*b*) Discuss the conversion of galvanometer into ammeter. 7

P.T.O.

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

(*a*) Varactor diode

(*b*) Construction of NPN transistor

(*c*) Shunt capacitor filter

(*d*) Sensitivity of galvanometer.

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

PA—114—2024

FACULTY OF SCIENCE

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

APRIL/MAY, 2024

ELECTRONICS

Paper IV

(Digital Logic Circuits)

(Thursday, 2-05-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two Hours *Maximum Marks*—40

Note :—Attempt *All* questions.

1. What is decoder ? Design BCD to seven segment decoder. 15

Or

(*a*) Draw the circuit diagram of S.R. Flip-Flop and explain its working. 8

(*b*) Explain T-type Flip-Flop. 7

2. Define asynchronous counter. Explain the working of 4-bit asynchronous counter. 15

Or

(*a*) Explain R-2R ladder DAC with neat circuit diagram. 8

(*b*) Explain parallel comparator ADC. 7

P.T.O.

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

(*a*) BCD to decimal decoder

(*b*) One-bit memory cell

(*c*) Parallel in parallel out

(*d*) Quantization error.

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

PA—313—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Semester) EXAMINATION

APRIL/MAY, 2024

(CBCS/New Pattern)

COMPUTER SCIENCE

Paper–III

(Introduction to Data Structure)

(Saturday, 04-05-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

(*ii*) Draw neat labelled diagram wherever necessary.

1. What is linked list ? Explain representation of linked list in memory also write an algorithm for inserting an element at the beginning of a linked list. 15

Or

(*a*) What is data structure ? Explain various data structure operation in detail. 8

(*b*) Explain control structures in detail. 7

P.T.O.

2. What is 'Queue' ? Explain memory representation of 'queue' ? Write and explain the algorithm for inserting an element in 'queue'. 15

Or

(*a*) What is 'Graph' ? Explain memory representation of graphs. 8

(*b*) Explain "Threaded Binary tree". 7

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

(*a*) Algorithmic notation

(*b*) Traversing and Searching

(*c*) Memory represenation of stack

(*d*) Over flow and under flow

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

PA—320—2024

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2024

(CBCS/New Pattern)

COMPUTER SCIENCE

Paper—IV

(Programming in C Language)

(Friday, 10-05-2024) **Time : 10.00 a.m. to 12.00 noon**

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. Explain data types and their types in detail. 15

Or

(*a*) Explain arithmetic operators and types of arithmetic expressions with example. 8

(*b*) Explain do-while statement in detail. 7

P.T.O.

2. Explain string handling functions strlen( ), Strcat( ), Strcmp( ) Strcpy( ) with suitable example. 15

Or

(*a*) What is array ? Explain their types in detail. 8

(*b*) Write a program in C to find average of three numbers. 7

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

(*a*) Structure

(*b*) Else-if ladder

(*c*) Relational operator

(*d*) Register.

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

PA—162—2024

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2024

(New Pattern)

FISHERY SCIENCE

Paper III

(Fresh Water Fish Culture Technology)

(Saturday, 04-05-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Give an account of integrated fish farming. 15

Or

Write notes on :

(*a*) Types of cultivable fishes 8

(*b*) Hatching pits. 7

2. Describe in detail post-stocking management. 15

Or

Write notes on :

(*a*) Mono-culture and poly-culture 8

(*b*) Cage culture. 7

P.T.O.

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

(*a*) Pen culture

(*b*) Topography and soil type

(*c*) Eradication of aquatic weeds

(*d*) Composite Fish Culture in India.

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

PA—216—2024

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (Second Semester) EXAMINATION

APRIL/MAY, 2024

FISHERY SCIENCE

Paper IV

(Fish Seed Production and Hatchery Management)

(Friday, 10-05-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

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

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

1. Give an account of Bundh breeding. 15

Or

Write notes on :

(*a*) Glass Jar Hatchery 8

(*b*) Hatching happa. 7

P.T.O.

2. Describe in detail artificial fertilization by stripping. 15

Or

Write notes on :

(*a*) Gears used for collection of spawn. 8

(*b*) Methods of collection of spawn. 7

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

(*a*) Selection of spawn collection site

(*b*) CIFE-D80 model

(*c*) Open transportation system

(*d*) Classification of fish seed.