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SA—75—2025

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2025

(New/CBCS Pattern)

ZOOLOGY

Paper VII

(Biochemistry)

(Wednesday, 23-4-2025)

Time : 2.00 p.m. to 4.00 p.m.

Time—Two Hours

Maximum Marks—40

Note :— (i) Attempt *all* questions.

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

1. Explain in detail classification of carbohydrates. 15

Or

(a) Describe in detail classification of enzymes. 8

(b) Explain in detail lock and key model and induced fit hypothesis. 7

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2. Explain in detail glycolysis.

15

Or

(a) Describe in detail β -oxidation pathway.

8

(b) Deamination and decarboxylation.

7

3. Attempt any *two* of the four (each of 5 marks) :

10

(a) Properties of lipids

(b) Glycogenesis

(c) Ketolysis

(d) Effect of temperature and pH on enzyme activity.

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FACULTY OF SCIENCE

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

APRIL/MAY, 2025

MATHEMATICS

Paper XI

(Partial Differential Equations)

(Saturday, 26-4-2025)

Time : 2.00 p.m. to 4.00 p.m.

Time—Two Hours

Maximum Marks—40

Note :— (i) All questions are compulsory.

(ii) Figures to the right indicate full marks.

1. Explain the rules for finding the complementary function of the equation : 15

$$a_0 \frac{\partial^2 z}{\partial x^2} + a_1 \frac{\partial^2 z}{\partial x \partial y} + a_2 \frac{\partial^2 z}{\partial y^2} = 0.$$

Explain the rule for finding the particular integral of the partial differential equation :

$$f(D, D') = F(x, y)$$

when :

$$F(x, y) = x^m y^n.$$

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Or

- (a) Explain the working rule of Lagrange's linear equation is an equation of type : 8

$$P_p + Q_q = R$$

- (b) Solve : 7

$$p(1+q) = qz$$

2. Explain the Charpit's method to solve partial differential equation :15

$$f(x, y, z, p, q) = 0$$

Or

- (a) Obtain the solution of the wave equation : 8

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

by D' Alembert's method.

- (b) Solve the wave equation :

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

such that $y = P_0 \cos pt$, (P_0 is constant) when $x = l$ and $y = 0$ when $x = 0$. 7

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

- (a) Form a partial differential equation from :

$$x^2 + y^2 + (z - c)^2 = a^2$$

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(b) Solve :

$$(D - D' - 2) (D - D' - 3)z = e^{3x} - 2y$$

(c) 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

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

(d) Find the general solution of :

$$\frac{\partial^2 z}{\partial x^2} + \frac{3\partial^2 z}{\partial x \partial y} + \frac{2\partial^2 z}{\partial y^2} = x + y.$$

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FACULTY OF SCIENCE

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

APRIL/MAY, 2025

(CBCS/New Pattern)

MATHEMATICS

(Ordinary Differential Equations-VIII)

(Friday, 25-4-2025)

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) *Attempt (A) or (B : a, b) in question Nos. 1 and 2.*

1. (A) Define linear differential equation with example and explain method

to solve the linear equation of the first order is $\frac{dy}{dx} + Py = Q$, where

P and Q are functions of x or constant and $\cos^2 x \frac{dy}{dx} + y = \tan x$. 15

Or

(B) (a) Define Clairaut's equation and solve it.

8

(b) Solve :

$$(x^2 - 4xy - 2y^2), dx + (y^2 - 4xy - 2x^2) dy = 0.$$

7

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2. (A) Explain the method for finding particular integral corresponding to a term of the form $\sin ax$ or $\cos ax$ in the second member. 15

Solve :

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

Or

- (B) (a) Explain the method for solving : 8

$$\frac{d^n y}{dx^n} + P_1 \frac{d^{n-1} y}{dx^{n-1}} + \dots + P_n y = 0$$

where the coefficients $P_1, P_2, \dots, P_n$ are constants and auxiliary equation having equal roots.

- (b) Solve : 7

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

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

- (a) Explain the method of solving :

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

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

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(b) Solve :

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

(c) Solve :

$$\frac{d^3 y}{dx^3} - \frac{3d^2 y}{dx^2} + 4y = 0.$$

(d) Solve :

$$\frac{d^2 y}{dx^2} + y = xe^{2x}.$$

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FACULTY OF SCIENCE

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

APRIL/MAY, 2025

(CBCS/New Pattern)

MATHEMATICS

Paper VII

(Group Theory)

(Wednesday, 23-4-2025)

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 suitably labelled diagrams wherever necessary.

(iii) Figures to the right indicate full marks.

1. If A be a non-empty set and let R be an equivalence relation in A . Let a and b be arbitrary elements in A , then prove that : 15

(i) $a \in [a]$

(ii) If $b \in [a]$, then $[b] = [a]$

(iii) $[a] = [b]$ iff $(a, b) \in R$

(iv) Either $[a] = [b]$ or $[a] \cap [b] = \phi$.

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Or

- (a) State and prove Lagrange's theorem. 8
- (b) Prove that every group of prime order is cyclic. 7
2. Prove that the set of residue classes modulo m is an abelian group of order m with respect to addition of residue classes. 15

Or

- (a) Suppose G is a group and N is a normal subgroup of G . Let f be a mapping from G to G/N defined by :

$$f(x) = N.x \quad \forall x \in G$$

then prove that f is a homomorphism of G onto G/N and kernel of f is N . 8

- (b) Prove that intersection of any collection of normal subgroup is itself a normal subgroup. 7
3. Attempt any *two* of the following : 5 each

- (a) If H is any subgroup of G and $h \in H$, then prove that $Hh = H = hH$.
- (b) Let a be a fixed element of a group G , then prove that the mapping $f_a : G \rightarrow G$ defined by :

$$f_a(x) = a^{-1}xa \quad \forall x \in G$$

is an automorphism of G .

- (c) If I be the set of all integers and R be a relation in I defined as xR_y holds iff $x - y$ is divisible by 5, $x, y \in I$, then prove that R is an equivalence relation.
- (d) Prepare the composition table for the group :

$$G = \{0, 1, 2, 3, 4\}$$

with respect to addition modulo 5 and write down the inverse of each element of G .



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SA—325—2025

FACULTY OF SCIENCE & TECHNOLOGY

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

APRIL/MAY, 2025

(CBCS/New Pattern)

COMPUTER SCIENCE

Paper VII

(Programming in C++)

(Thursday, 8-5-2025)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—40

N.B. :— (i) Attempt all questions.

(ii) Assume suitable data, if necessary.

(iii) Draw well labelled diagram, wherever necessary.

- 1. What is OOPs ? Explain principles of OOPs with advantages and disadvantages of POP and OOP. 15**

Or

- (a) Explain the looping statement in C++ with example. 8**
(b) Write a program on factorial number of given integer number. 7

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- 2. What is Inheritance ? Explain different types of inheritance with example. 15**

Or

- (a) Write a program on static data member. 8**
(b) Write a program on Friend function. 7
3. Write short notes on (any two) : 10
(a) Object oriented language
(b) Operator in C++
(c) Function overloading
(d) Destructor.

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FACULTY OF SCIENCE AND TECHNOLOGY

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

MARCH/APRIL, 2025

(New/CBCS Pattern)

BOTANY

Paper—VII

(Plant Physiology and Biochemistry)

(Thursday, 17-4-2025)

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 labelled diagrams wherever necessary.

1. What is ascent of sap ? Write a note on transpiration pull theory. 15

Or

Describe in brief :

(a) Munch-Mass flow hypothesis 8

(b) Ion Exchange Theory. 7

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2. Define seed dormancy. Explain in detail different methods of breaking seed dormancy. 15

Or

Describe in brief :

(a) Biological functions of terpenoids 8

(b) Biological functions of proteins 7

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

(a) Diffusion

(b) Foliar nutrition

(c) Long day plants

(d) Secondary structure of proteins.

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