21PHYC401 Reg No : .....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FOURTH SEMESTER DEGREE EXAMINATION MAY 2025

PHYSICS

Thermal Physics and Electronics

Duration:2 Hours **Max Marks:60**

PART - A

Answer any five questions, selecting minimum of one question from every unit : 5×9=45

UNIT I

1. a) Give the Clausius statement of the second law of thermodynamics.

   b) Derive the relation between pressure, volume and temperature for an ideal gas undergoing adiabatic change. **(2+7)**

2. a) Sate the significance of T-S diagram.

   b) Arrive at an expression for the change of entropy in an irreversible process. **(2+7)**

UNIT II

3. a) Give any two results of porous plug experiment.

   b) With a neat diagram describe the process for production of low temperature by adiabatic demagnetization. **(2+7)**

4. a) Give the equation for the Rayleigh - Jeans law in terms of frequency and wavelength and explain the terms used.

   b) Write the four thermodynamical relations. Explain the concept of Enthalpy and Gibb's function. **(2+7)**

UNIT III

5. a) Write a note on ripple factor.

   b) With a neat diagram explain how a Zener diode can be used as a voltage regulator. **(2+7)**

6. a) Write the equation for drain current in JFET and mention the symbols used.

   b) Draw and explain the input characteristics and output characteristics of a transistor in CE mode. **(2+7)**

UNIT IV

7. a) Convert 27 from decimal to binary system.

   b) What is an inverting amplifier? How can an OPAMP be used as an inverting amplifier? Derive expression for its voltage gain and mention the values of input & output resistances. (2+7)

8. a) Write the logic expression and diagram for D'Morgan's second theorem.

   b) With diagram explain the working of an AND gate using discrete components. Give its truth table, logic expression and logic symbol. (2+7)

PART - B

Answer any three questions: 3×5= 15

9. 1 gm of water at 20 °C is converted into ice at -10 °C at constant pressure. Heat capacity of 1 gm of water is 4.2×10^3 J/kg/K and that of ice is 2.1×10^3 J/kg K. Heat of fusion of ice at 0 °C = 3.35×10^5 J/kg. Calculate the total change in the entropy of the system

10. An iron ball having surface area 4×10^{-2} m^2 and at a temperature of 727°C is placed in an enclosure at 227°C. If surface emissivity of iron is 0.4, find heat radiated by the ball $\sigma = 5.67 \times 10^{-8}$ $Wm^{-2}K^{-4}$.

11. In an OP- AMP, R_1 = 50 kΩ and feedback resistance r_f = 100 kΩ. Find output voltage, voltage gain and by considering a non- inverting amplifier with V_{in} = 100 mV.

12. Simplify the Boolean expression and draw the logic diagram for
    $Y = (\bar{A} + B + C)(\bar{A} + B + C)$

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100

19BOT401 Reg No : .....

CHOICE BASED CREDIT SYSTEM

B.Sc. FOURTH SEMESTER DEGREE EXAMINATION MAY 2025

BOTANY

Botany Theory IV

Duration:3 Hours Max Marks:80

I. Answer any FIVE of the following : **(5×2= 10 Marks)**

1. Which division is called reduction division? What is the minimum ploidy required for this.
2. What are Leucoplasts? Mention its types.
3. What are intercalary meristems? Mention the position in plants.
4. What is Back cross? Give its significance?
5. What is unisexuality? Give an example for unisexual flowers.
6. Write the features of stele in dicot stem.

II. Answer any FIVE of the following : **(5×6= 30 Marks)**

7. Give the functions of Golgi apparatus and endoplasmic reticulum.
8. Discuss the types of stomata based on the arrangement of subsidiary cells.
9. Explain in detail about the living mechanical tissue of plant body with their types and functions.
10. List out the differences between trachea and sieve tubes.
11. Explain the morphology of pollengrains in detail.
12. Describe the structure of dicot seed.

III. Answer any FOUR of the following : **(4×10= 40 Marks)**

13. Give detailed account of Nucleosome model.
14. Comment on complete and incomplete linkage.
15. Explain Complementary gene inheritance with an example.
16. Explain the ultra structure of a chloroplast with a diagram. Add a note on its functions.
17. Explain structure and types of ovules in detail.

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21BOTC401 Reg No : .....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FOURTH SEMESTER DEGREE EXAMINATION MAY 2025

BOTANY

Ecology and Conservation Biology

Duration:2 Hours Max Marks:60

I. Answer any Five of the following : **(5×2= 10 Marks)**

1. Define pyaramid of numbers with an example.
2. What are pneumatophores? Where do you find them?
3. Define (i) Density (ii) frequency
4. Define Phtotochemical smog.
5. What is minimata disease?
6. What are NTFP's? Give Example.
7. What are endemic plants? Name any two endemic plants of the Western Ghats.
8. What is species diversity? Give an example.

II. Answer any FOUR of the following : **(4×5= 20 Marks)**

9. Write the anatomical adaptions of xerophyte.
10. List out the characters of Alluvial soil and Red soil.
11. Explain the pioneer stages of xeroxere and hydrosere.
12. Explain different types of ecosystem.
13. Write a note on Indian forest act
14. Explain pond ecosystem in detail.
15. Write the scientific name, family, parts used and uses of any two medicinal plants.
16. Write a note on (i) Zoo (ii) Botanical Garden

III. Answer any THREE of the following : **(3×10= 30 Marks)**

17. Explain the effect of Temperature on vegetation.
18. Give an account of In-situ conservation.
19. Explain the steps involved in nitrogen cycle.
20. Give a brief account of vegetation of karnataka.

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21MICC401 Reg No : .....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FOURTH SEMESTER DEGREE EXAMINATION MAY 2025

MICROBIOLOGY

Microbial Enzymology and Metabolism

Duration:2 Hours Max Marks:60

SECTION - A

Answer the following strictly observing the internal choice provided: 4×5=20

UNIT 1

1) Define biosynthesis and write briefly about carbohydrate metabolism.

OR

2) Define fermentation, metabolism and list the uses of Propionic acid.

UNIT 2

3) Write a short note on Glycolate metabolism.

OR

4) Write about the symbiotic nitrogen fixing bacteria.

UNIT 3

5) Write a short note on Isomerases and Oxidoreductases.

OR

6) Write a note on enzyme unit and specific activity.

UNIT 4

7) Write briefly on Steady state assumptions.

OR

8) Write a note on pH sensitivity of enzymes.

SECTION - B

Answer the following strictly observing the internal choice provided: 4×10=40

UNIT 1

9) Explain in detail about Phosphoketolase pathway.

OR

10) Explain in detail Butanol acetone fermentation and its importance.

UNIT 2

11) Explain in detail about beta Oxidation of fatty acids and the role of different enzymes in it.

OR

12) Write in detail about Methanogens, methanogenesis and Methylotrophs.

UNIT 3

13) Describe catalytic mechanism of enzymes with example.

OR

14) Describe transition state and activation energy with a graphical representation.

UNIT 4

15) Describe competitive inhibition with an example.

OR

16) Describe regulation of enzymes by proteolytic cleavage.

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21MATC401 Reg No : .....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FOURTH SEMESTER DEGREE EXAMINATION MAY 2025

MATHEMATICS

Partial Differential Equations and Integral Transforms

Duration:2 Hours **Max Marks:60**

PART - A

I. Answer any 6 questions. Each question carries 2 marks: **(2×6= 12 Marks)**

a. Eliminate a and b from the following relation to form a partial differential equation: $z = ax + by + a$.

b. Solve : $z = px + qy + p^2 + q^2$.

c. Solve : $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2} = 0$

d. Solve :$(4D^2 + 12DD' + 9D'^2)z = 0$.

e. Find $L\{e^{-4t} + 3e^{-2t}\}$.

f. Find $L\{\sin kt \cos kt\}$.

g. Find $L^{-1}\{\frac{4}{s^5}\}$.

h. Find $L^{-1}\{\frac{3s+1}{(s+1)^4}\}$.

PART - B

2. Answer any 2 questions. Each question carries 6 marks: **(6×2= 12 Marks)**

a. Find the complete integral of $q = (z + px)^2$.

b. Solve: $\sqrt{p} + \sqrt{q} = x$.

c. Solve: $py + qx = pq$.

d. Solve: $px(y^2 + z) - qy(x^2 + z) = z(x^2 - y^2)$.

PART - C

3. Answer any 2 questions. Each question carries 6 marks: **(6×2= 12 Marks)**

a. Reduce $\frac{\partial^2 z}{\partial x^2} = (1 + y^2)\frac{\partial^2 z}{\partial y^2}$ to canonical form.

b. Reduce $\frac{\partial^2 z}{\partial x^2} + 2(\frac{\partial^2 z}{\partial x \partial y}) + \frac{\partial^2 z}{\partial y^2} = 0$ to canonical form.

c. Reduce $\frac{\partial^2 z}{\partial x^2} + y^2 \frac{\partial^2 z}{\partial y^2} = y$ to canonical form.

d. Solve : $u_{xx} - u = 0$

PART - D

4. Answer any 2 questions. Each question carries 6 marks: **(6×2= 12 Marks)**

a. Derive the formula for $L\{\cos kt\}$.

b. Find $L\{F(t)\}$ where $F(t) = \begin{cases} t, & 0 < t < 4, \\ 5, & t > 4 \end{cases}$.

c. a) Define Gamma function and find $L\{t^{5/2}\}$.
b) Write the value of $\Gamma(6)$

d. Find the Laplace Transform of the function
$\Psi(t,c) = \begin{cases} 1, & 0 < t < c \\ 0, & c < t < 2c \end{cases}$, $\Psi(t + 2c, c) = \Psi(t, c)$.

PART - E

5. Answer any 2 questions. Each question carries 6 marks: **(6×2= 12 Marks)**

a. (i) Find $L^{-1}\{\frac{k}{s(s^2+k^2)}\}$ using convolution theorem .
(ii) Find $L\{(t-4)^2 \alpha(t-4)\}$.

b. Find and sketch $F(t) = L^{-1}\{\frac{(1-e^{-2s})(1-3e^{-2s})}{s^2}\}$. Also find $F(1), F(3), F(5)$.

c. Solve: $y''(x) + y(x) = 4e^{x}$ with $y(0) = 0$, $y'(0) = 0$ using Laplace transforms.

d. Find the Fourier series of the function $f(t) = \begin{cases} 0, & -2 < t < -1 \\ k, & -1 < t < 1 \\ 0, & 1 < t < 2 \end{cases}$ with period $T = 4$.

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19MAT401 Reg No : .....

CHOICE BASED CREDIT SYSTEM

B.Sc. FOURTH SEMESTER DEGREE EXAMINATION MAY 2025

MATHEMATICS

Mathematics Theory IV

Duration:3 Hours **Max Marks:80**

I. Answer any EIGHT of the following : **(8×3= 24 Marks)**

a. Define inverse element . Find the inverse element of $A = \begin{bmatrix} -2 & 3 & 4 \\ 4 & 10 & -1 \end{bmatrix}$ in the group of all 2×3 matrices with respect to addition.

b. Prove that $(Z, +)$ is an infinite abelian group.

c. Define subgroup. Prove that the set Q of all rational numbers form a subgroup of $(R, +)$ where R is the set of all real numbers.

d. Define even permutation and odd permutation. Determine whether the permutation (2 1 3)(4 6 2)(5 6 1 2) is even or odd.

e. Let R^+ be the multiplicative group of non-zero reals. Which of the following mapping of R^+ into R^+ are group homomorphism? Find the kernel in the case of a homomorphism.
(I)$x \to x^2$ (Ii) $x \to \frac{1}{x}$

f. Find the singular points of $f(z) = \frac{2z+1}{z(z^2+1)}$.

g. Find the domain of definition of $f(z) = \frac{1}{z^2+1}$.

h. Simplify :$(1 - i)^4$.

i. Find all values of z such that $e^z = -2$.

j. Prove that $sin(iy) = isinhy$ and $cos(iy) = coshy$.

II. Answer any EIGHT of the following : **(8×7= 56 Marks)**

a. Let G be a group and a and b be elements in G.
Prove that the equations $ax = b$ and $ya = b$ have unique solutions in G.

b. Let H be a finite subset of group G such that $a, b \in H$ whenever a,b∈ H. Prove that H is a subgroup of G.

c. Prove that any subgroup of a cyclic group is cyclic.

d. Let $\theta : G \to G'$ be a homomorphism of G onto G' and $K = ker\theta$. Prove that G/K is isomorphic to G'.

e. State and prove Lagrange's theorem.

f. Find the 4^{th} roots of unity.

g. Prove that $f'(z)$ does not exist at any point for $f(z) = e^{(x-iy)}$.

h. Prove that the function $u(x, y) = y^3 - 3x^2y$ is harmonic and find its harmonic conjugate.

i. Show that $Log(1+i)^2 = 2Log(1+i)$

j. Prove that $-i\sin(iz) = \sin hz$ and $\cos(iz) = \cos hz$.

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21STAC401 Reg No : .....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FOURTH SEMESTER DEGREE EXAMINATION MAY 2025

STATISTICS

Statistical Inference - I

Duration:2 Hours **Max Marks:60**

Answer any THREE of the following : **(3×2= 06)**

1. Define Point Estimation.
2. Define MVB Estimators.
3. What do you mean by Likelihood Function and how do you get it?
4. State the properties of Likelihood Ratio Test Procedure.
5. State the 95% CI for the population mean of a Normal Population when SD σ known

Answer any FOUR of the following in not more than a page each : **(4×6= 24)**

6. If $x_1, x_2, \ldots, x_n$ is a random sample from N (Θ, σ^2) ,show that sample mean and sample variance are jointly sufficient for Θ and σ^2.
7. Distinguish between Parametric, Nonparametric and Sequential tests.
8. Find the size and power of the test for testing H_0:θ=2 against H_1:θ=4 for a random sample drawn from an exponential population with parameter θ when the critical region is $X > 4$.
9. Applying NP Lemma ,if $x_1, x_2, \ldots, x_n$ is a random sample of size n drawn from an Exponential distribution with parameter θ. Obtain BCR for testing H_0:$\theta = \theta_0$ against H_1:$\theta = \theta_1$. Derive null distribution of the test statistic.
10. Discuss the test procedure for testing the difference in the population proportions of two populations.
11. Derive 100(1-α)% confidence interval for the Population proportion based on a random sample of large size.

Answer any THREE of the following in not more than two page each : (3×10= 30)

12. If $x_1, x_2, \ldots, x_n$ is a random sample of size n from U(-θ, θ) distribution. Show that X(n) is biased for θ. Find a function of X(n) which is unbiased for θ. Is X(n) asympotically unbiased?

13. Find the m.l.e of the parameter θ when a random sample of size n drawn from a Beta distribution of first kind with parameters (1,θ) . Also find the m.l.e of $\frac{\theta}{1+\theta}$

14. Obtain UMP test procedure for testing $H_0: \mu = \mu_0$ against $H_1: \mu \neq \mu_0$ based on a random sample of size n drawn from a Normal population with an unknown variance σ^2.

15. Derive LRTP for testing equality of variances of two Normal populations whose means known.

16. Obtain 100(1-α)% central confidence interval for the difference in means of two independent normal populations with known variances σ_1^2 and σ_2^2.

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21CHEC401 Reg No : .....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FOURTH SEMESTER DEGREE EXAMINATION MAY 2025

CHEMISTRY

Inorganic and Physical Chemistry - II

Duration:2 Hours **Max Marks:60**

PART - A

I. Answer any Six from the following: **(2×6= 12 Marks)**

1. Give two examples for the limitations of Octet rule.
2. Silver chloride is covalent while KCl is Ionic. Give reason.
3. Give two examples for ionic compounds of AX_2 type.
4. What is a cyclic process?
5. Define psuedo molecular reaction. Illustrate with example.
6. State the Third law of thermodynamics.
7. Write Gibb's Helmholtz equation and explain the terms.
8. What is homogenous catalysis? Give an example.

PART - B

II.Answer any SIX of the following choosing at least one question from each unit: (6×8= 48 Marks)

UNIT I

9. a) Calculate the radius ratio in compounds with coordination number 4.
   b) Explain hexagonal close packing in solids. (4+4)

10 a) Explain dsp^2 hybridisation in case of $[Ni(CN)_4]^{2-}$.
   b) Explain the formation of octahedral complexes with an example. (4+4)

UNIT II

11. a) Explain the combination of 2p atomic orbitals.
    b) Draw the molecular orbital energy level diagram for C_2 and Li_2 molecule. (4+4)

12 a) Explain Insulators and Semiconductors based on Band Theory.
   b) Write a short note on the properties of metals (4+4)

UNIT III

13. a) Draw the Molecular orbital energy level diagram for CO molecule.

b) The vanderWaals constants a and b for Hydrogen gas are 0.0246 atm dm^6 mol^{-2} & 2.67×10^{-2} dm^3 mol^{-1} respectively. Calculate the Inversion temperature. (5+3)

14 a) Explain Electrodialysis and reverse osmosis techniques of treating waste water.

b) Write a note on Freundlich Adsorption Isotherm. (5+3)

UNIT IV

15. a) Mention any two methods of determination of order of a reaction.

b) Write a short note on temperature dependence of reaction rate. (4+4)

16 a) Write a note on entropy change in reversible and irreversible process.

b) Write a note on Thermodynamic scale of temperature. (4+4)

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21CSCC401 Reg No : .....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FOURTH SEMESTER DEGREE EXAMINATION MAY 2025

COMPUTER SCIENCE

Database Management Systems

Duration:2 Hours **Max Marks:60**

PART A

Answer any FIVE questions: **(5×2= 10)**

1) Define Data Model.
2) Write the characteristics of DBMS.
3) Draw the notations of entity in E-R modeling.
4) Illustrate the use of BETWEEN clauses in selecting a tuple.
5) Define 3NF Relation.
6) What is a Transaction processing system?

PART B

Answer any FIVE questions : **(5×6= 30)**

7) Explain the characteristics and purpose of database approach.
8) Explain the different types of relationships.
9) Explain primary key constraint with example.
10) Explain COUNT and SUM function with example.
11) a) What is End transaction? b) What is Commit transaction? Explain.
12) What are the possible reasons for a transaction to fail? Explain.

PART C

Answer any TWO questions : **(2×10= 20)**

13) Explain the types of languages provided by DBMS.
14) Explain the various ER diagram notations.

15) Create the table clientmaster and use a check constraints on the client number field so that client number values starts with 'c', a check constraints on the name field so that name is entered in uppercase, a check constraints on the city column of clientmaster so that the cities Bombay, New Delhi, Madras, Calcutta are allowed. Solve the following queries.

a) Display the details of client whose name starts with 'R'

b) Find the number of client living in Bombay.

c) Find the number of client with baldue more than 5000 and also their table balance.

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19ZOO401 Reg No : .....

CHOICE BASED CREDIT SYSTEM

B.Sc. FOURTH SEMESTER DEGREE EXAMINATION MAY 2025

ZOOLOGY

Zoology Theory IV

Duration:3 Hours Max Marks:80

I. Answer any FIVE of the following : **(5×2= 10 Marks)**

1. What are liver sinusoids?
2. What causes Dwarfism?
3. What is anadromous migration? Give an example.
4. Define courtship behaviour.
5. Name any four enemies of earthworms.
6. Define fisheries.

II. Answer any FIVE of the following : **(5×6= 30 Marks)**

7. Draw a neat labeled diagram of Pituitary gland.
8. Draw a neat labeled diagram of T.S of Kidney of mammal.
9. Write short notes on territorial behaviour.
10. Explain social Organization in Elephants.
11. Explain any three types of poultry diseases.
12. Explain the process storing, packing and marketing of vermicomposting.

III. Answer any FOUR of the following : **(4×10= 40 Marks)**

13. Describe the histology of T.S of Spleen of a mammal.
14. Explain the functions of female sex hormones.
15. Explain communication in monkey troops.
16. Explain the methods of studying bird migration.
17. Write explanatory note on milk and its use.

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21ZOOC401 Reg No : .....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FOURTH SEMESTER DEGREE EXAMINATION MAY 2025

ZOOLOGY

Gene Technology, Immunology and Computational Biology

Duration:2 Hours **Max Marks:60**

SECTION - A

Answer the following strictly observing the internal choice provided: **4×5=20**

UNIT 1

1) Outline the steps involved in Recombinant DNA technology.

OR

2) Give an account of Monoclonal Antibodies.

UNIT 2

3) Differentiate between Innate and Acquired Immunity.

OR

4) Explain the role of IgG in Immune system.

UNIT 3

5) What are Vaccines? Explain immunization schedule for children.

OR

6) Explain sequence analysis. Mention different types.

UNIT 4

7) Write a short note on Histogram with an example.

OR

8) Write a short note on Variance.

SECTION - B

Answer the following strictly observing the internal choice provided: **4×10=40**

UNIT 1

9) Explain the structure and advantages of using PBR322 and PUC vectors in Genetic Engineering.

OR

10) Give an account on transgenic cows.

UNIT_2

11) Explain Humoral immunity exhibted by the B lymphocytes.

OR

12) Explain Antigen with neat labelled diagram.

UNIT_3

13) Explain different types of organ transplantation. Add a note on graft rejection.

OR

14) Explain sequence analysis with reference to pairwise and multiple sequence alignment.

UNIT_4

15) Explain the Tabular presentation of data with a neat labeled diagram.

OR

16) Explain Student's test with suitable example.

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22NHEC401 Reg No : .....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.A./B.Sc. FOURTH SEMESTER DEGREE EXAMINATION MAY 2025

NUTRITION AND HEALTH EDUCATION

Public Health Nutrition

Duration:2 Hours **Max Marks:60**

SECTION - A

Answer the following strictly observing the internal choice provided: **4×5=20**

UNIT 1

1) What are food frequency questionnaires? (2)
   How are they useful in nutritional assessments? (3)

OR

2) What are the different levels of health care services? Explain each briefly.

UNIT 2

3) What are the common risk factors for developing Iron Deficiency Anemia?

OR

4) Write a note on VAD.

UNIT 3

5) Write a note on modifications done for children with special needs.

OR

6) What are the nutritional requirement for an athlete?

UNIT 4

7) Write a note on technologies for food and nutrition security.

OR

8) Explain in detail on chronic hunger with preventive measures.

SECTION - B

Answer the following strictly observing the internal choice provided: **4×10=40**

UNIT 1

9) Write a note on (5+5)
   i) ICDS
   ii) Mid day meal programmes

OR

10) Analyze the impact of malnutrition on public health and explain the role of nutrition interventions in addressing this issue.

UNIT 2

11) Explain the management and treatment of smoking.

OR

12) Explain Iron Deficiency Anaemia under following heads.
   i) Symptoms
   ii) Prophylaxis programs

UNIT 3

13) Explain the basic guidelines in disaster management.

OR

14) i) Explain the nutritional considerations for a person living in a desert. (6)
   ii) What is the reason for change in the requirement? (4)

UNIT 4

15) Explain the factors affecting food safety.

OR

16) Write a detailed note on the role and objectives of Buffer stock operations and PDS.

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