

FACULTY OF SCIENCES
M.Sc. (BOTANY) I – SEMESTER REGULAR EXAMINATION, DEC- 2016
BRYOLOGY, PTERIDOLOGY AND PALEONTOLOGY

PAPER – 03

Time: 3 hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

Section – A

Answer the following questions in not more than **ONE** page each: (5x4=20)

1. Gemma cups
2. Heterospory
3. *Selaginella*- L.S. of Strobilus
4. *Rhynia*-Complete plant
5. *Equisetum*- V.S. of Strobilus

Section – B

Answer the following questions in not more than **FOUR** pages each: (5x10=50)

6. a) Give an account of classification of Bryophytes.
(OR)
b) Discuss ecology of Bryophytes.
7. a) Explain the Telome concept and its applications.
(OR)
b) Discuss briefly Heterospory and seed habit.
8. a) Describe the structure of sporangium in *Lycopodium* sp.
(OR)
b) Describe the life history of *Equisetum*.
9. a) What is Paleobotany? Discuss its scope and objectives.
(OR)
b) Give brief account of Birbal Sahni Institute of Paleobotany and its contributions.
10. a) Explain fossil history of Bryophytes.
(OR)
b) Explain evolution and origin of early vascular plants.

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FACULTY OF SCIENCE
M.Sc. (CHEM-OC/PCH-2YPGP) I – SEMESTER REGULAR EXAMINATIONS, DEC- 2016
PHYSICAL CHEMISTRY
PAPER – 03
(Common paper)

Time: 3 hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

Section – AAnswer the following questions in not more than **ONE** page each: (5x4=20)

1. Show that $\Delta S = q_{\text{rev}}/T$.
2. How do you evaluate the thermodynamic parameters from the EMF of cell?
3. Explain the Black Body radiation.
4. Discuss the Collision theory of bi molecular reactions.
5. What is meant by Chemical potential? Derive the Gibbs-Duhem equation.

Section – BAnswer the following questions in not more than **FOUR** pages each: (5x10=50)

6. a) i) Derive an expression for the entropy change accompanying the isothermal expansion of an ideal gas.
 ii) Calculate the entropy change accompanied during the expansion of 5 moles of an ideal gas from a pressure of 1.0 atm to that of 0.5 atm at 298K.
 (OR)
 b) i) Derive the Clapeyron- Clausius equation.
 ii) 6 moles of an ideal gas expand isothermally and reversibly from a volume of 1dm^3 to a volume of 10dm^3 at 27°C . What is the maximum work done? Express result in Joules.
7. a) i) Explain the postulates of Debye –Huckel theory of electrolytic solutions.
 ii) Calculate the mean activity coefficient of 0.01M ZnCl_2 aq.solution using Debye-Huckel limiting law. The value of Debye-Huckel constant A is 0.5091.
 (OR)
 b) i) What is meant by activity coefficient of an electrolyte? How would you determine the mean ionic activity coefficient of HCl in a given solution of the acid.
 ii) Write a note on Bjerrum theory of ion association.
8. a) i) Write the postulates of Quantum mechanics.
 ii) Define an operator. Write about (I). Hamiltonian operator (II).Momentum operator.

(OR)

- i). Derive time independent Schrodinger wave equation from time dependent Schrodinger wave equation.
- ii). Prove that Eigen functions of Hermitian operator with different Eigen values are orthogonal to each other.
9. a) i) "All gas phase first order unimolecular reactions will follow second order kinetics at low pressures", explain.
ii) Write about correlations in nucleophilic substitution reactions.
(OR)
b) i) What are parallel and opposing reactions? Derive the rate expression for a first order parallel reactions.
ii) Write about the Swain-Scott equation.
10. a) i) Discuss the thermodynamic Criteria for spontaneity and equilibrium of a reaction.
ii) How do you determine solubility product from the EMF measurements.
(OR)
b) i) Find the Commutator $[d^2/dx^2, 5]$ using the function $\sin 2x$.
ii) Discuss how Hammett substituent constant and reaction constant are useful in understanding the mechanism of reactions.

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FACULTY OF SOCIAL SCIENCES
M.A (Economics) I– SEMESTER REGULAR EXAMINATIONS, DEC-2016
QUANTITATIVE METHODS - I
PAPER – III

Time: 3 hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

Section – AAnswer the following questions in not more than **ONE** page each: (5x4=20)

1. Uses and limitations of mathematics in economics.
2. The concept of a partial derivatives.
3. State the requisites of good average.
4. Distinguish between correlation and regression.
5. Tests of adequacy of index numbers.

Section – BAnswer the following questions in not more than **FOUR** page each: (5x10=50)

6. a) Define the concept of a function and enumerate the different types of functions.

(OR)

- b) Find the total cost function: $TC = 3Q^2 + 2Q + 12$ find AC and MC.

7. a) State the Conditions of Maxima and Minima of a function of two variables.

(OR)

- b) Find the first order and second order derivatives of the following functions:

i) $y = x^3 - 2x^2 + 10x - 5$ ii) $z = x^3 - xy - 2y^3$

8. a) Examine the various methods of collecting the primary data.

(OR)

- b) Calculate the mean, median and mode for the following data:

Size	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	1	2	5	14	10	9	2

9. a) Define Rank Correlation co-efficient, when is it preferred to Karl Pearson's co-efficient of correlation.

(OR)

- b) Calculate Spearman's rank correlation co-efficient for the following data:

X	8	10	15	20	15
Y	2	4	7	15	7

10. a) Examine the criteria for good index number.

(OR)

- b) Calculate Fisher's Index for the following data:

Commodity	Base year		Current year	
	Price	Quantity	Price	Quantity
Necessaries	4	52	6	48
Comforts	12	43	15	36
Luxuries	30	25	40	16

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FACULTY OF ARTS
M.A. (ENGLISH) I – SEMESTER REGULAR EXAMINATIONS, DEC-2016
ENGLISH LITERATURE UPTO THE EARLY 17TH CENTURY - II
PAPER – III

Time: 3 Hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

Section – A

(5x4=20)

Answer the following questions in not more than **ONE** page each:

1. A brief note on single source translations of the Bible.
2. The theme of 'Madness' in Shakespeare's Hamlet.
3. Describe the love between Ferdinand & Miranda in Shakespeare's *The Tempest*.
4. George Herbert's poem *Virtue*.
5. Andrew Marvell *To His Coy Mistress*.

Section – B

(5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) Write in detail the different individual translations of the Bible.
(OR)
b) The concept of tragedy as elucidated in Aristotle's Poetics.
7. a) Discuss the significance of old age and death in Shakespeare's King Lear.
(OR)
b) What is the tragic flaw in Shakespeare's Hamlet? Explain further.
8. a) Describe 'Sycorax' and 'Prospero' as two people with similar affinities are presented as evil and good in Shakespeare's *The Tempest*.
(OR)
b) How 'Malvolio' is troubled by Sir Toby, Sir Andrew, Feste, and Maria and explain how the comic element is created through this in Shakespeare's *The Twelfth Night*.
9. a) Explain the following lines from John Donne's *The Canonisation*.
For God's sake hold your tongue, and let me love,
Or chide my palsy, or my gout,
My five gray hairs, or ruined fortune flout,
With wealth your state, your mind with arts improve,
(OR)
b) What is the central theme of *The Pulley* by George Herbert?
10. a) A detailed analysis of Andrew Marvell *To His Coy Mistress*.
(OR)
b) What is the importance of the natural world for this speaker Richard Lovelace's *To Althea from Prison*?

FACULTY OF COMMERCE
M.Com. (Gen/E-Com) I – SEMESTER REGULAR EXAMINATIONS, DEC- 2016
MARKETING MANAGEMENT

PAPER – III

Time: 3 Hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

Section – A

(5x4=20)

Answer the following questions in not more than **ONE** page each:

1. Rural Vs. Urban Markets.
2. Benefits of segmentation.
3. Levels of a product.
4. Classification consumer goods.
5. Promotion mix.

Section – B

(5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) Define marketing management? Explain the importance and scope of marketing.
(OR)
b) Explain the stages in marketing planning and strategy.
7. a) Write about the various target market strategies.
(OR)
b) What are the major factors influencing consumer behavior?
8. a) What are the implications of Product Life Cycle to the marketers?
(OR)
b) Write about the factors influencing the pricing decision.
9. a) Write about the factors influencing the channel design decisions in marketing.
(OR)
b) Write in detail about the role of various marketing intermediaries in the channel management.
10. a) With suitable examples explain the various promotion tools used in marketing.
(OR)
b) Explain the important decisions in advertising.

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FACULTY OF SCIENCE
M.Sc. (MATHEMATICS) I – SEMESTER REGULAR EXAMINATIONS, DEC-2016
TOPOLOGY
PAPER – III

Time: 3 Hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

Section – A

(5x4=20)

Answer the following questions in not more than **ONE** page each:

1. Suppose X is a topological space. Prove that any closed subset of X is the disjoint union of its set of isolated points and its set of limit points.
2. Suppose X is a topological space and $\{X_i\}$ is a non empty finite clan of compact subspaces of X show that $\bigcup_i X_i$ is also a compact sub space of X .
3. Deduce Urysohn's lemma from Tietze's extension theorem.
4. Prove that a topological space X is disconnected if and only if there exists a continuous mapping of X on to the discrete two point space $\{0, 1\}$.
5. Suppose X is any arbitrary non-empty set and S is any arbitrary clan of subsets of X . Prove that S can serve as an open sub base for a topology on X .

Section – B

(5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) State and prove Kuratowski closure axioms.
(OR)
b) In a second countable space if a non-empty open set G can be written as a union of a class $\{G_i\}$ of open sets prove that G can be written as a countable union of G_i s.
7. a) State and prove Lebesgue covering lemma.
(OR)
b) Prove that every sequentially compact metric space is
i) Totally bounded ii) Compact
8. a) i) Prove that every compact Hausdorff space is normal.
ii) Show that a closed subspace of a normal space is normal.
(OR)
b) State and prove Urysohn's imbedding theorem.
9. a) i) Prove that every interval of \mathbb{R} is a connected set.
ii) Suppose A is a connected sub space of a topological space X and B is a subspace of X such that $A \leq B \leq \bar{A}$. Prove that B is connected.
(OR)
b) Define a component of a topological space. State and prove any three main facts about components.
10. a) State and prove Urysohn's lemma.
(OR)
b) Prove that a subset of \mathbb{R} is connected if and only if it is an interval.

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FACULTY OF SCIENCE
M.Sc. (PHYSICS/PE) I – SEMESTER REGULAR EXAMINATIONS, DEC-2016
QUANTUM MECHANICS-I
PAPER – III

Time: 3 Hours]

[Max. Marks: 70

Note: Answer all the following questions from Section – A and Section – B

Section – A

(5x4=20)

Answer the following questions in not more than **ONE** page each:

1. Define adjoint and Hermitian operators.
2. Show that the eigen values of parity operator are +1 and -1.
3. What are the properties of Pauli spin operators?
4. Explain the validity of WKB approximation.
5. Under what conditions can one apply perturbation theory?

Section – B

(5x10=50)

Answer the following questions in not more than **FOUR** pages each:

- 6 a) State and prove Ehrenfest theorem.

(OR)

- b) i) Define projection operator and explain its physical significance.
ii) Show that the eigen kets of Hermitian operator belonging to different eigen values are orthogonal.

- 7 a) Explain the effect of parity operation on the observables position, linear momentum and angular momentum.

(OR)

- b) Show that translational symmetry in space and time gives the conservation of linear momentum and energy respectively.

- 8 a) Calculate the eigen values of J^2 and J_z by using their commutation relations.

(OR)

- b) What are Clebsch-Gordon coefficients? Obtain the Clebsch-Gordon coefficients for a system having $j=1/2$ and $j=1/2$.

- 9 a) Determine the ground state energy of normal Helium atom by using variation method.

(OR)

- b) Discuss the n-n-degenerate perturbation theory for a time independent perturbation. Use this theory to calculate first order correction to the ground state energy of an an-harmonic potential $V = m\omega^2 x^2/2 + \lambda x^4$

- 10 a) i) Write a short note on Heisenberg uncertainty principle.
ii) Distinguish between Schrodinger and Heisenberg pictures.

(OR)

- b) i) Show that $[J^2, J_z]=0$
ii) Write a note on alpha decay

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FACULTY OF SCIENCES
ZOO I – SEMESTER REGULAR EXAMINATIONS, DEC- 2016
IMMUNOLOGY
PAPER – III

Time: 3 Hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

Section – A

(5x4=20)

Answer the following questions in not more than **ONE** page each:

1. Thymus
2. Macrophages
3. FISH
4. Graves disease
5. Transplantation

Section – B

(5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) Discuss the immunological functions of lymph nodes.
(OR)
b) Explain in detail about the Innate Immunity.
7. a) Write in brief about the different classes of Immunoglobulin.
(OR)
b) What is complement system? Briefly describe its importance.
8. a) Describe in detail the Type-III – Immuno complex mediated hypersensitivity.
(OR)
b) What are the reasons responsible for auto immunity?
9. a) Describe methods employed to prevent graft rejection.
(OR)
b) Briefly describe about the tumor specific antigens.
10. a) Write in brief about the structure and functions of Major Histocompatibility Complex (MHC).
(OR)
b) Describe the nature of interaction and immuno pathological consideration of viral infections.

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