

NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-I
PAPER-I
(Non-Chordates and Chordates)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. What is Coelom ? Describe organization of Coelom in Annelida.
2. Describe ciliary and flagellar movement in Protozoa.
3. Give an account of filter-feeding mechanism in polychaeta.
4. Give an account of respiratory pigments in invertebrates.
5. Write short notes on any **Two** of the following :—
 - (a) Pseudocoelomate
 - (b) Metamerism
 - (c) Trochophore larva
 - (d) Book lung

GROUP-B

6. Describe structure and affinities of Balanoglossus.
7. Describe evolution of aortic arches in vertebrates.
8. Give a comparative account of heart of Amphibia and Aves.
9. Give an account of derivatives of integument in vertebrates.
10. Write short notes on any **Two** of the following :—
 - (a) Ctenoid Scale
 - (b) Echidina
 - (c) Contour feathers
 - (d) Double Circulation

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Examination Programme, 2015
M.Sc. Zoology, Part-I

<i>Date</i>	<i>Paper</i>	<i>Time</i>	<i>Examination Centre</i>
12.05.2015	Paper-I	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
14.05.2015	Paper-II	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
16.05.2015	Paper-III	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
18.05.2015	Paper-IV	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
20.05.2015	Paper-V	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
22.05.2015	Paper-VI	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
26.05.2015	Paper-VII	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
28.05.2015	Paper-VIII	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna

NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-I
PAPER-II
(Taxonomy, Biodiversity and Conservation)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Give an account of hierarchy of categories.
2. Describe different types of biodiversity.
3. Describe the various category of species.
4. What is taxonomic key ? Give different types of taxonomic keys.
5. Write short notes on any **Two** of the following :—
 - (a) Quarantine
 - (b) Species concept
 - (c) Uses of biosystematics in commerce
 - (d) Population systematics

GROUP-B

6. Describe Wild life conservation in India.
7. Give an account of various theories of biodiversity variation.
8. Give an account of sample count, line transect method and pug marking.
9. Describe characteristics and adaptation of forest biome.
10. Write short notes on any **Two** of the following :—
 - (a) Wild-life Protection Act 1972
 - (b) Benthos
 - (c) Census of threatened species
 - (d) Diversity stability

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NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-I
PAPER—III
(Ecology, Environmental Biology and Toxicology)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Give an account of different types of life tables with examples.
2. What do you mean by ecological model ? Give a brief account of fundamentals of ecological model.
3. Give an account of niche concept with special reference to its ecological significance.
4. Describe the different categories of mutualism. How mutualism is evolved in nature ?
5. Write short notes on any **Two** of the following :—
 - (a) Predation.
 - (b) Optimal foraging theory.
 - (c) Net reproductive rate.
 - (d) Competition.

GROUP-B

6. What is adaptation ? Describe different aspects of adaptation.
7. Give a brief account of environmental acts of India.
8. Describe the role of light and pressure on the survival of organisms.
9. Give an account of basic concept of environmental stress and homeostasis.
10. Write short notes on any **Two** of the following :—
 - (a) Mountain sickness.
 - (b) Tolerance.
 - (c) Solar energy.
 - (d) Coastal regulation zone.

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Revised Examination Programme, 2015
M.Sc. Zoology, Part-I

Date	Paper	Time	Examination Centre
14.05.2015	Paper-II	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
16.05.2015	Paper-III	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
18.05.2015	Paper-IV	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
20.05.2015	Paper-V	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
22.05.2015	Paper-VI	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
26.05.2015	Paper-VII	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
28.05.2015	Paper-VIII	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
30.05.2015	Paper-I	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna

NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-I
PAPER-IV
(Ethology and Evolution)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Define learning and give an account of types of learning.
2. What is parental care ? Describe parental care in amphibia.
3. Write an essay on fish migration.
4. Describe the various aspects of mating behaviour found in animal.
5. Write short notes on any **Two** of the following :—
 - (a) Orientation
 - (b) Habitate selection
 - (c) Diapause
 - (d) Circardian Rhythman

GROUP-B

6. Describe the “Hardy-Weinberg Law” of genetic equilibrium.
7. give an account of micro and macro evolution.
8. Describe isolating mechanism.
9. Define phylogeny ? Describe restriction enzyme sites.
10. Write short notes on any **Two** of the following :—
 - (a) Darwinism
 - (b) Phenotype
 - (c) Lethal mutation
 - (d) Species concept

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Revised Examination Programme, 2015
M.Sc. Zoology, Part-I

<i>Date</i>	<i>Paper</i>	<i>Time</i>	<i>Examination Centre</i>
14.05.2015	Paper-II	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
16.05.2015	Paper-III	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
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26.05.2015	Paper-VII	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
28.05.2015	Paper-VIII	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
30.05.2015	Paper-I	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna

NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-I
PAPER-V
(Animal physiology and Biochemistry)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Give an account of urine formation in mammal.
2. Describe the physiological adaption of fresh water environment in animals.
3. Describe the physiological effect of temperature on homoeothermic animals.
4. Give an account of Ventilation of lung during respiration process in mammal.
5. Write short notes on any **Two** of the following:—
 - (a) Hibernation
 - (b) Oxygen dissociation curve
 - (c) S-A node
 - (d) Sarcomeres

GROUP-B

6. Describe structure and classification of carbohydrates.
7. Give an account of different steps of Glycolysis and its energetic.
8. Describe the process of irreversible covalent activation, using the example of two gastro intestinal enzymes.
9. Describe classification and properties of protein.
10. Write short notes on any **Two** of the following:—
 - (a) Riboenzyme
 - (b) Membrane transport
 - (c) Na⁺ K⁺ pump.
 - (d) Operon Concept

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NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-I
PAPER-VI
(Cytogenetics and Microbial Genetics)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Describe structural and functional organization of lamp brush chromosome.
2. Describe the methods of heterokaryon selection.
3. Give an account of banding number, banding nomenclature and classification of human karyotype.
4. With the help of diagram, describe the events of alternative splicing that lead to sex determination in *Drosophila*.
5. Write short notes on any **Two** of the following:—
 - (a) Squash preparation.
 - (b) Down's syndrome
 - (c) Polytene chromosome
 - (d) Radiation hybrid

GROUP-B

6. Describe the separation of chromosome by Flow cytometry.
7. How DNA is transferred from one bacterial cell to another by bacterial virus.
8. Describe the physical mapping of chromosome.
9. Describe the role of radiation, viruses and clastogens in cytogenetic effect.
10. Write short notes on any **Two** of the following:—
 - (a) F-factor
 - (b) Bacteriophages
 - (c) DNA finger printing
 - (d) Transduction

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NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-I
PAPER-VII
(Molecular Biology and Genetics)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Describe the important scopes of molecular biology for human being.
2. Give an account of DNA replication in eukaryotes.
3. Give an account of process of Splicing.
4. Describe the process and regulation export of mRNA.
5. Write short notes on any **Two** of the following:—
 - (a) Replicons
 - (b) Sigma factor
 - (c) Proof reading
 - (d) RNA editing

GROUP-B

6. Explain general properties of genetic code.
7. Describe the procedure of gene cloning.
8. What do you mean by DNA repair mechanism ? Explain it.
9. How do the functions of rRNA, mRNA and tRNA differ during the process of protein synthesis ?
10. Write short notes on any **Two** of the following:—
 - (a) Elongation factor
 - (b) Chromosome map
 - (c) Central dogma
 - (d) Gene conversion.

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For Practical Counselling Class & Practical Examination Programme Please See on Back Page.

NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-I
PAPER-VIII
(Basic Physical and Chemical Principles and Instrumentation)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Describe the process of electron transport and release of energy.
2. What are radioactive isotopes? Discuss its uses in the treatment of diseases.
3. What is free energy? Describe its role in a bio-chemical reaction.
4. Write the third law of thermodynamics.
5. Write short notes on any **Two** of the following:—
 - (a) Entropy
 - (b) Hydrogen bond
 - (c) pH scale
 - (d) Acidic buffer

GROUP-B

6. Describe the different components of HPLC.
7. Give an account of different types of Electrophoresis.
8. Write the principle and application of gas liquid chromatography.
9. Explain these :—
 - (a) Photo sensitization
 - (b) Photo inhibitors
10. Write short notes on any **Two** of the following:—
 - (a) TLC
 - (b) Colorimeter
 - (c) Chemilluminescence
 - (d) Photometry

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नालन्दा खुला विश्वविद्यालय के **M.Sc. Zoology, Part-I** के सभी विद्यार्थियों को सूचित किया जाता है कि दिनांक 12.05.2015 की परीक्षा जो भूकम्प के कारण स्थगित कर दी गयी थी, अब दिनांक 30.05.2015 को अपने पूर्व निर्धारित समय एवं स्थान पर आयोजित होंगी ।

Revised Examination Programme, 2015
M.Sc. Zoology, Part-I

Date	Paper	Time	Examination Centre
28.05.2015	Paper-VIII	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna
30.05.2015	Paper-I	3.30 PM to 6.30 PM	MGM College, Kankarbagh Main Road, Patna

**For Practical Counselling Class & Practical Examination Programme
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NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-II
PAPER–IX
(Quantitative Biology and Microbiology)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Give and account of classification and applications of Biostatistics.
2. Describe the assumption for Chi-square test. Mention important properties of Chi-square.
3. Explain the normal distribution and properties of normal probability distributions
4. Define analysis of variance and discuss one way analysis of variance
5. Write short notes on any **Two** of the following :—
 - (a) Null hypothesis
 - (b) Regression
 - (c) Levels of significance
 - (d) Poisson distribution

GROUP-B

6. Describe the protozoan microbes and discuss the related diseases.
7. Give an account of bacterial microbes and related disease.
8. Describe the status of human genome project and also discuss the importance of bioinformatics.
9. Explain these:—
 - (a) Food microbiology
 - (b) Environmental biotechnology
10. Write short notes on any **Two** of the following :—
 - (a) Symptoms of AIDS
 - (b) Single cell protein
 - (c) Antibody
 - (d) Tuberculosis

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Examination Programme, 2015
M.Sc. Zoology, Part-II

<i>Date</i>	<i>Papers</i>	<i>Time</i>	<i>Examination Centre</i>
06.06.2015	Paper-IX	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
08.06.2015	Paper-X	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
10.06.2015	Paper-XI	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
12.06.2015	Paper-XII	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
16.06.2015	Paper-XIII	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
18.06.2015	Paper-XIV	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
20.06.2015	Paper-XV	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
22.06.2015	Paper-XVI	12.00 Noon to 3.00 PM	Nalanda Open University, Patna

NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-II
PAPER-X
(Biotechnology)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. What do you mean by Northern blotting ? Discuss its significance in the study of gene expression.
2. Give an account of Colorimeter and its applications.
3. Give an account of classification of Confocal Microscope on the basis of scanning system and add a note on its application in biology and medicine.
4. Explain the procedure and advantage of DNA assay by Fluorescence method.
5. Write short notes on any **Two** of the following :—
 - (a) HIV Virus.
 - (b) Radioactive Decay.
 - (c) Nitrocellulose Membrane.
 - (d) Fluorophores.

GROUP-B

6. Give an account of principle and applications of flow cytometry.
7. Write an essay on Biosensor.
8. What is immunological technique ? Discuss direct and indirect ELISA with suitable illustrations.
9. Give an account of permanent histological slide preparation.
10. Write short notes on any **Two** of the following :—
 - (a) Cytological Fixatives.
 - (b) Apoptosis.
 - (c) Comet Assay Method.
 - (d) Hoechst Staining.

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NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-II
PAPER–XI
(Immunology & cells and Tissues)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Define haptens ? Discuss the role played by haptens.
2. Define hypersensitivity ? Write the Comb's and Gell classification of hypersensitivity.
3. Give an account of acquired immune response.
4. What are secondary lymphoid organs ? Write a brief account of each of them.
5. Write short notes on any **Two** of the following :—
 - (a) Natural Killer Cells
 - (b) Immunogenicity
 - (c) Organ transplant
 - (d) Mismatched transfusion

GROUP-B

6. Describe fluidmosaic model of cell membrane.
7. Describe the structure, composition and distribution of Apoprotein.
8. Give an account of active transport across cell membrane.
9. Describe the relationship between cell surface receptor and second messenger system.
10. Write short notes on any **Two** of the following :—
 - (a) Adipose tissues
 - (b) Cyclosis
 - (c) AMP Kinase
 - (d) Trafficking of protein

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NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-II
PAPER-XII
(Parasitology)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. How parasites are transmitted by mosquitoes and housefly ?
2. Give an account of life cycle of *Leishmania donovani*.
3. Describe the life cycle of *Ancylostoma duodenale*.
4. Describe the history, symptoms, pathogens and control of malaria.
5. Write notes on any **Two** of the following:—
 - (a) Human louse
 - (b) Trophozoite stage
 - (c) Amoebic dysentery
 - (d) Filariasis

GROUP-B

6. What are antigens ? How do they affect our immune system ?
7. Enumerate the technique of counter Immunoelectrophoresis.
8. Describe prevention and control of livestock diseases.
9. Describe various classes of antibodies and their biological activities.
10. Write short notes on any **Two** of the following:—
 - (a) ELISA
 - (b) Liverfluke
 - (c) Lice in cattle
 - (d) Lymphoid cells

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NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-II
PAPER–XIII
(Development Biology)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Describe the process of Spermatogenesis.
2. Give an account of molecular events during fertilization in Vertebrate.
3. Describe development of extraembryonic membrane in amniotes and its functions.
4. Describe the mechanism of semination and add a note on semen quality.
5. Write short notes on any **Two** of the following :—
 - (a) Ovulation
 - (b) Blastula formation
 - (c) Microlecithal
 - (d) capacitation

GROUP-B

6. Describe the role played by juvenile hormone in insect metamorphosis.
7. Describe characteristic features and application of stem cells.
8. Give an account of role of thyroxine in amphibian metamorphosis.
9. Define potency. Discuss in detail the totipotent and pluripotent.
10. Write short notes on any **Two** of the following :—
 - (a) Ecdysone
 - (b) Bone marrow
 - (c) Differentiation
 - (d) Moulting cycle.

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NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-II
PAPER–XIV
(Endocrinology)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Describe structure of pituitary gland and mention the functions of hormones secreted by it.
2. Draw a histological diagram of thyroid gland and explain the biosynthesis of thyroxine.
3. Give an account of histological structure of Islets of Langerhans and describe physiological action of insulin.
4. Describe the biosynthesis and regulation of adrenal hormones.
5. Write short notes on any **Two** of the following :—
 - (a) Acromegaly
 - (b) Gigantism
 - (c) Milk ejection reflex
 - (d) Calorigenesis

GROUP-B

6. Describe the histology of ovary and functions of ovarian hormones.
7. Give an account of biosynthesis and functions of gastro-intestinal hormones.
8. "Hormones as messenger" justify this statement.
9. Give an account of chemical structure of hormone and properties of hormones.
10. Write short notes on any **Two** of the following :—
 - (a) Emergency hormone
 - (b) Addison's disease
 - (c) Hypoglycemia
 - (d) Cholecystokinin–Pancreozymin (CCK)

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NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-II
PAPER–XV
(Entomology)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Describe the different types of mouthparts of insects.
2. Describe the different kinds of insect pheromone.
3. Give an account of metamorphosis in insects.
4. Describe the male and female reproductive organs of an insect.
5. Write short notes on any **Two** of the following :—
 - (a) Malpighian tubules
 - (b) Spiracles
 - (c) Tymbal organ
 - (d) Polyembryology

GROUP-B

6. Give an account of biological control of insect pests.
7. Describe life history and control of any two pests of vegetables.
8. Give an account of classification of insecticides on the basis of their chemical nature.
9. Describe the strategies of pest management.
10. Write short notes on any **Two** of the following :—
 - (a) Chemosterilization
 - (b) Economic injury level
 - (c) Pests of rice
 - (d) Key pests

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**For Practical Counselling Class & Practical Examination Programme
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NALANDA OPEN UNIVERSITY
M.Sc. Zoology, Part-II
PAPER–XVI
(Ichthyology & Inland Fisheries)
Annual Examination, 2015

Time: 3 Hours.

Full Marks: 80

*Answer five questions in all, selecting at least two questions from each Group.
All Questions carry equal marks.*

GROUP-A

1. Describe the digestive system of a herbivore fish, *Garra lamata*
2. Give an account of ecological status of rivers and streams.
3. Describe air-breathing organs of a catfish, *Heteropneustes fossilis*.
4. Describe the mechanism of gill ventilation in teleostean gills with special reference to buccal pressure and opercular suction pump.
5. Write short notes on any **Two** of the following:—
 - (a) Oceanography
 - (b) Gonadosomatic index (GSI)
 - (c) Haldane effect
 - (d) Ganga river system

GROUP-B

6. Describe prawn culture in fresh water in India.
7. Describe cancer of fishes.
8. Give an account of different types of crafts and gears used in fish capture in marine water system.
9. Write an essay on fish products.
10. Write short notes on any **Two** of the following:—
 - (a) Brackish Water
 - (b) Monoculture
 - (c) Exotic carp
 - (d) Induced breeding

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**For Practical Counselling Class & Practical Examination Programme
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