



**MAHATMA GANDHI UNIVERSITY**  
**PRIYADARSHINI HILLS, KOTTAYAM 686 560**

**MODEL QUESTION PAPERS**  
**(Theory)**

**RESTRUCTURED CURRICULUM**  
**AND SYLLABI IN**  
**CHOICE BASED COURSE**  
**&**  
**CREDIT AND SEMESTER SYSTEM**

**FOR**

**UNDERGRADUATE PROGRAMMES**  
**AND INTRODUCTION OF GRADING**

**IN**

**ZOOLOGY PROGRAMME**

## **2009 ADMISSION ONWARDS**

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## **B.Sc. ZOOLOGY PROGRAMME**

### **Programme Objectives**

The B.Sc. Zoology programme is designed to help the students to:

1. Impart basic knowledge of various branches of Zoology and General biology meant both for a graduate terminal course and for higher studies.
2. Inculcate interest in and love of nature with its myriad living creatures.
3. Understand the unity of life with the rich diversity of organisms and their ecological and evolutionary significance
4. Acquire basic skills in the observation and study of nature, biological techniques, experimental skills and scientific investigation
5. Acquire basic knowledge and skills in certain applied branches to enable them for self employment

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6. Impart awareness of the conservation of the biosphere.

## **Programme Outcomes**

The graduate of this programme should be able to

1. Identify and list out common animals
2. Explain various physiological changes in our bodies
3. Analyze the impact of environment on our bodies
4. Understand various genetic abnormalities
5. Develop respect for nature
6. Explain the role and impact of different environmental conservation programmes
7. Identify animals beneficial to humans
8. Identify various potential risk factors to health of humans
9. Explain the importance of genetic engineering
10. Use tools of information technology for all activities related to zoology

## **Comments**

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1. These outcomes do not naturally get translated into specific courses
2. Designing courses to meet these outcomes is very difficult task and would constitute significant deviation from the current text book based approaches.

### **Course structure:**

The U.G.programme in Zoology must include (a) **Common Courses**, (b) **Core Courses**, (c) **Complementary Courses**, (d) **Open Courses** and (e) **Project**. No course shall carry more than 4 credits. The student shall select any **Choice Based Course** offered by the Department which **offers the core courses**, depending on the availability of teachers and infrastructure facilities, in the institution. **Open course** shall be offered in any subject and the **student shall have the option to do courses offered by other Departments/ or by the same Department.**

### **Course coding:**

Every course in the programme is coded according to the following criteria.

1. The first letter plus second letter /another letter from the programme ie., **ZY**
2. One digit to indicate the semester. ie., **ZY1 (Zoology, 1<sup>st</sup> semester)**
3. One letter from the type of courses such as, **A** for common course, **B** for core course, **C** for Complementary course, **D** for Open course. ie., **ZY1B (Zoology, 1<sup>st</sup> semester Core course)**
4. Two digits to indicate the course number of that semester. ie., **ZY1B01 (Zoology, 1<sup>st</sup> semester, Core course, course number is 01)**

5. The letter U to indicate for Under Graduate Programme.
6. One letter **V** for the Vocational course
7. ie., **ZY1BO1U** (**Zoology, 1<sup>st</sup> semester, Core course, courses number 01, U for UG Programme**)
8. **The letter (P) denotes practical**

## ZOOLOGY CODES

|        | <b>Code</b>  |
|--------|--|
| ZY     | Zoology  |
| ZYB    | Zoology Core Course<br>Zoology Core, Choice Based (ZY6B13U/ZY6B14U/ZY6B14U)                        |
| ZYB(P) | Zoology Core Practical   |
| ZYO    | Zoology Open Course<br>(ZY5DD1U/ZY5DO2U/ZY5DO3U)   |
| ZYC    | Zoology Complementary Zoology<br>(ZY1CO1U/ZY2CO2U/ZY3CO3U/ZY4CO4U)                                 |
| ZYC(P) | Zoology Complementary Zoology Practical 'Model I'<br>(ZY1CO1U[P]/ZY2CO2U[P]/ZY3CO3U[P]/ZY4CO4U[P]) |
| ZAV    | Zoology Vocational Aquaculture   |
| ZMV    | Zoology Vocational Medical Microbiology  |
| ZFV    | Zoology Vocational Food Microbiology   |

ZBV Zoology UGC Sponsored Vocational – Biological Techniques and Specimen preparation.

ZY6BPVU Zoology 6<sup>th</sup> semester core project viva undergraduate.

ZYCV Zoology Complementary Zoology for Vocational (Model II)  
(ZY1CVO1U/ZY2CVO2U/ZY3CVO3U/ZY4CVO4U)

## **INVESTIGATORY PROJECT, FIELD STUDY/ (STUDY TOUR) AND GROUP ACTIVITY**

### **A. Study tour/ field study, visit to research institute and various places of zoological importance**

Field study/study tours should be conducted for not less than 6 days (completed during entire programme), preferably spreading the study in the first to six semesters. Students are expected to visit at least 3 research institutes and various places of zoological importance.

### **B. Group Activity**

Students are expected to do one group activity in the fifth semester and submit the report in the sixth semester for external practical examination, along with study tour report

A maximum of ten students can choose any one group activity like aquarium management, vermicomposting, bee keeping, and conduct of zoological exhibitions, designing of posters of zoological importance, surveys related to disease outbreaks, community health programmes or any matter of zoological interest.

### **C. Project Work**

Each student is expected to complete 1 investigatory project in the sixth semester and report shall be submitted for the external practical examination. Viva- Voce will be conducted by the external examiners along with the 6<sup>th</sup> semester practical examinations. The projects are to be identified during the second semester of the programme with the help of the supervising teacher, and the work can be started latest by the beginning of the 3<sup>rd</sup> semester. The student has

to maintain a log book showing the progress of the project work, duly signed by the supervising teacher, at bimonthly intervals and may be shown to the external examiners on demand.

For A, B and C- total 36 hours and total 1 credit (18 hours in 5<sup>th</sup> semester and 18 hours in 6<sup>th</sup> semester).

### **Zero Credit Courses:**

Zero Credit courses shall be included in the programme to encourage advanced learners and shall be indicated in the score sheet. Permission for obtaining Zero credit courses shall be in accordance with the rules and regulations of the University. The Zero Credit courses shall be done only under the supervision of a university approved permanent faculty member of the department which offers the core courses.

### **Examinations:**

The evaluation of each course shall contain two parts such as Internal or In-Semester Assessment (IA) and External or End-Semester Assessment (EA). The ratio between internal and external examinations shall be 1:3. The Internal and External examinations shall be evaluated using Direct Grading system based on 5-point scale.

### **Internal or In-Semester Assessment (IA):**

Internal evaluation is to be done by continuous assessments on the following components. The Components of the internal evaluation for theory and practical and their weights are as below.

#### **Theory**

| Component   | Weight |
|-------------|--------|
| Attendance* | 1      |

|                      |   |
|----------------------|---|
| Assignment           | 1 |
| Seminar              | 1 |
| Best two test papers | 2 |

**\*Attendance**

| % of Attendance   | Grade |
|-------------------|-------|
| >90%              | A     |
| Between 85 and 90 | B     |
| Between 80 and 85 | C     |
| Between 75 and 80 | D     |
| < 75              | E     |

Assignments: Best of two assignments are considered per course. The student has to take a minimum of 1 seminar per course. A minimum of 2 class tests are to be attended. The grades of best 2 tests are to be taken.

**Practical**

| Component                 | Weightage |
|---------------------------|-----------|
| Attendance *              | 1         |
| Laboratory Involvement ** | 2         |
| Test                      | 2         |
| Record                    | 2         |
| Viva-Voce/Quiz            | 1         |
| Total                     | 8         |

**\*Attendance & Laboratory Involvement \*\***

| Attendance *       | Laboratory Involvement **  |
|--------------------|----------------------------|
| Attendance >90%= A | Punctuality +              |
| 89% to 85% = B     | Handling Equipments +      |
| 84% to 80% = C     | Skill in Laboratory work + |
| 79% to 75% = D     | Group Interaction = A      |
| < 75 =E            |                            |

The evaluation of all components is to be published and is to be acknowledged by the candidate. All documents of internal assessments are to be kept in the institution for 2 years and shall be made available for verification by the university. The responsibility of evaluating the internal assessment is vested on the teacher(s) who teach the course.

**External or End-Semester Assessment (EA):**

The external examination of all semesters shall be conducted by the university on the close of each semester. There will be no supplementary exams. For reappearance/ improvement as per university rules, students can appear along with the next batch.

Examinations (Practical):

**The practical examinations for the core courses at the end of semester 1, semester 2, semester 3 and semester 4 should be conducted by the university with a common time-table and questions set by the university. One examiner shall be selected from a panel of experts published by the university and the other internally. The**

**graded score sheet, duly certified by the head of the institution, should be sent to the university before the commencement of the end semester university examinations on theory courses. The practical examinations for the core courses at the end of semester 5 and semester 6 should be conducted externally by arranging two practical examinations in a session.**

**The practical examinations for the complementary courses at the end of semester 1, semester 2 and semester 3 should be conducted by the university with a common time-table and questions set by the university. One examiner shall be selected from a panel of experts published by the university and the other internally.. The graded score sheet, duly certified by the head of the institution, should be sent to the university before the commencement of the end semester university examinations on theory courses. The practical examinations for the complementary courses at the end of semester 4 should be conducted externally.**

#### **Pattern of Questions (Theory):**

**Questions shall be set to assess knowledge acquired, standard application of knowledge, application of knowledge in new situations, critical evaluation of knowledge and the ability to synthesize knowledge. The question setter shall ensure that questions covering all skills are set. He/She shall also submit a detailed scheme of evaluation along with the question paper.**

**A question paper shall be a judicious mix of objective type, short answer type, short essay type /problem solving type and long essay type questions. Different types of questions shall be given different weights to quantify their range.**

**For all semesters:**

1. The examination has duration of 3 hours
2. Each question paper has four parts A, B, C & D.
3. Part A contains 16 objective type questions of which the candidate has to answer all. Each bunch of 4 questions carries a weightage of 1
4. Part B contains 8 short answer type questions spanning the entire syllabus and the candidate has to answer 5 questions. Each question carries a weightage of 1.
5. Part C contains 6 short essay type spanning the entire syllabus and the candidate has to answer 4 questions. Each question carries a weightage of 2.
6. Part D contains 3 essay type questions spanning the entire syllabus and the candidate has to answer 2 questions. Each question carries a weightage of 4.

**MAHATMA GANDHI UNIVERSITY**  
**FIRST SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY1B01U. GENERAL METHODOLOGY & PERSPECTIVES IN SCIENCE**  
*(course code & course title).* **Total weightage:25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**  
**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. Which of the following field of scientific knowledge includes mountain, valleys, plains and deserts?
    - a. Atmosphere
    - b. Astrosphere
    - c. Lithosphere
    - d. Hydrosphere
  2. Which of the following is the function of a physical aid in observation for a scientist?
    - a. Assist and extend the observer's senses
    - b. Hold the non required component constant
    - c. Covert a phenomenon not detectable by sense into perception
    - d. All the above
  3. Watson and Crick secured Nobel prize in Medicine for:
    - a. Discovery of the structure of DNA
    - b. Discovery of gene therapy
    - c. Discovery of the structure of nucleus
    - d. The contributions in biochemistry and molecular biology
  4. The book "De Philosophiae Nature Principia Mathematica" is written by
    - a. Sir Issac Newton
    - b. Albert Einstein
    - c. Francis Bacon
    - d. Thomas Malthus
- .....
5. A molar solution contains
    - a. 1 g molecular weight of the dissolved substance in 1 litre of the solution
    - b. 1 g molecular weight of the dissolved substance in 1 ml of the solution
    - c. 1 mg molecular weight of the dissolved substance in 1 litre of the solution
    - d. None of the above

6. One nanometer is equal to
- $1^{-3}$  of a meter
  - $1^{-6}$  of a meter
  - $1^{-9}$  of a meter
  - $1^{-12}$  of a meter
7. SPCA stands for
- Society for Promoting Cultural Activities
  - Society for Prevention of Cruelty to Animals
  - Society for Prevention of Catching of Animals
  - Society for Protection of Caged Animals
8.  $100^{\circ}$  C Celsius or Centigrade is equal to
- 158  $^{\circ}$ Fahrenheit
  - 212  $^{\circ}$ Fahrenheit
  - 194  $^{\circ}$ Fahrenheit
  - None of the above
- .....
9. Pooter is a device used to collect
- Small mammals
  - Small insects
  - Butterflies
  - Pelagic fishes
10. *Naja naja* is the scientific name for
- King Cobra
  - Cobra
  - Saw scaled viper
  - Russels viper
11. Wildlife protection Act in India was enacted in
- 1962
  - 1972
  - 1982
  - 1986
12. The surface features of specimen can be observed best in
- Transmission Electron microscope
  - Scanning Electron microscope
  - Phase contrast microscope
  - Light microscope
- .....
13. Rf value means
- Distance moved by solute/distance moved by solvent
  - Distance moved by solvent/distance moved by solute
  - Distance moved by solute x distance moved by the solvent
  - None of the above
14. Binomial nomenclature means
- Naming of animals by one name

- b. Naming of animals by two names
  - c. Naming of animals by three names
  - d. Naming of animals by four names
15. A family tree based on phenetic classification is called
- a. Dendrogram
  - b. Polygram
  - c. Demogram
  - d. Phylogram
16. The average pH of commercially available soft drink is 4.5. It means soft drinks are
- a. Acidic
  - b. Basic
  - c. Neutral
  - d. None of the above

.....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

- 17. Explain the scientific method?
- 18. Briefly describe the merits and demerits of science.
- 19. State the basic requirements of a good scientific proposal.
- 20. Write down the principle and applications of electrophoresis.
- 21. Give the principle and techniques of chromatography.
- 22. What are the uses of X ray crystallography in sciences
- 23. What is taxidermy? How it helps in zoological studies.
- 24. Explain the importance of Drosophila and Guinea pig in biological studies.

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

- 25. "Science is the quest for power, not for the truth". Discuss the statement in the current global context.
- 26. Discuss the structure of a scientific paper
- 27. Distinguish between assignment, seminar and colloquium.
- 28. Briefly describe the revolutions in science and technology during post industrial period.
- 29. What are the requirements for the settlement of an animal house?
- 30. Describe major laws of animal rights in India.

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

- 31. Write an essay on various types of separation techniques.
  - 32. Briefly describe the history of biology. Point out the major landmarks.
  - 33. Explain the principle and use of electron microscopy. Differentiate various types and major uses.
- .....

**MAHATMA GANDHI UNIVERSITY**  
**SECOND SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY2B02U. BIODIVERSITY AND MODERN SYSTEMATICS (course code &**  
*course title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of four)**

1. Who introduced the term biodiversity?
  - a. Wilson E.O.
  - b. Walter G. Rosen
  - c. Norman Myres
  - d. Haeckel
2. The Rio Summit is popularly known as
  - a. Boston Summit
  - b. Kyoto Summit
  - c. Berlin Summit
  - d. Earth Summit
3. The CBD was signed in
  - a. 2002
  - b. 1998
  - c. 1992
  - d. 2008
4. Among the following places, this is not a biodiversity hotspot
  - a. Western ghat
  - b. Eastern ghat
  - c. Himalayas
  - d. Narmada valley

.....
5. Which is the active ingredient present in Neem?
  - a. Tartaric acid
  - b. Curcumin
  - c. Azadiactrin
  - d. Pepsin

6. Which among the following is an invasive species in Kerala?
  - a. Nilgiri Tahr
  - b. Common Langur
  - c. Thilapia
  - d. Tree Pie
  
7. The population density of Kerala as per 2001 census?
  - a. 500/sq.km
  - b. 700/sq.km
  - c. 650 /sq.km
  - d. 819 sq.km
  
8. Pick out the endemic mammal in the Western Ghats
  - a. Toddy Cat
  - b. Tiger
  - c. Nilgiri Languar
  - d. Otter
  

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9. The Biodiveristy Act in India was formulated in the year
  - a. 2005
  - b. 2002
  - c. 2004
  - d. 1998
  
10. Name the author of Systema Natura
  - a. Dickens
  - b. T.H.Morgan
  - c. Carl Linnaues
  - d. Francis Crick
  
11. The head quarters of ICZN is in
  - a. Washigton D.C
  - b. Paris
  - c. Vienna
  - d. London
  
12. Cladistics was developed by
  - a. Wastson
  - b. Khorana
  - c. Hennings
  - d. Whittaker
  

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13. *Corvus splendens* is
  - a. Common Crow
  - b. Myna
  - c. Jungle Crow
  - d. Sun bird
  
14. RFLP is a technique in
  - a. Biodiversity

- b. Cytology
  - c. Medicine
  - d. Molecular Phylogeny
15. In situ conservation means:
- a. Process of protecting an endangered plant or animal species in its natural habitat
  - b. Process of protecting an endangered plant or animal species in a new location
  - c. Process of protecting endangered insects
  - d. None of the above
16. One among the following is a bird sanctuary
- a. Chimminy wildlife sanctuary
  - b. Thattekkadu wildlife sanctuary
  - c. Peppara wildlife sanctuary
  - d. Idukki wildlife sanctuary

.....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

- 17. What are the achievements of Rio Summit?
- 18. Give two salient features of CBD.
- 19. Explain the significance of genetic diversity
- 20. What are the criteria for attributing Hot Spot status to an area?
- 21. What are key stone species? Describe a few local examples.
- 22. What is a taxa? Comment on Linear hierarchy.
- 23. Explain salient features of environment protection act 1986.
- 24. Describe different sampling techniques.

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

- 25. Comment on the distribution of biodiversity on earth.
- 26. Briefly describe the ecosystem service of biodiversity.
- 27. Discuss the role of UNEP in biodiversity conservation
- 28. Explain the basic characteristics of dichotomous and polytomous keys.
- 29. Why Systematics is important?
- 30. Comment on TOL?

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

- 31. Give an account on threats to biodiversity.
  - 32. Discuss why biodiversity conservation is essential for human well being.
  - 33. Describe modern trends in taxonomy.
- .....

**MAHATMA GANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY3B03U. ANIMAL DIVERSITY – NON CHORDATA (course code & course title)**  
**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time: 3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of four)**

1. What is a sun animalcule?  
 a) Amoeba    b) Paramecium    c) Actinophrys    d) Plasmodium
2. Which of the following is known as venus flower basket?  
 a) Cliona    b) Euplectella    c) Sycon    d) Leucosolenia
3. Example of a digenetic parasite  
 a) Entamoeba    b) Enterobium    c) Planaria    d) schistosoma
4. The causative organism of gambian fever  
 a) Leishmania    b) Trypanosoma    c) Amoeba    d) Entamoeba
5. Name the rectal ciliate  
 a) Paramecium    b) Plasmodium    c) Opalina    d) Actinophrys
6. 'Aristotle lantern' is seen in  
 a) Antedon    b) Star fish    c) Echinus    d) Ophiothrix
7. The connecting link between annelids and arthropods is  
 a) Nereis    b) Belostoma    c) Peripatus    d) Balanus
8. The animal which causes parasitic castration is  
 a) Eupagurus    b) Sacculina    c) Crab    d) Lepisma

9. The first larvae of penaeus
  - a) Zoea b) Nauplius c) Mysis d) Protozoa
10. Name the mushroom coral
  - a) Favia b) Fungia c) Madrepora d) Aurelia
11. Name of the phylum to which 'Arrow worms' belong to
  - a) Rotifera b) Hemichordata c) Chaetognatha d) Annelida
12. Which of the following is an arachnid ectoparasite?
  - a) Spider b) Scorpion c) Daphnia d) Tick

- .....
13. The function of contractile vacuole
    - a) Nutrition b) Reproduction c) Osmoregulation d) Locomotion
  14. Mention the class of Echinococcus
    - a) Cestoda b) Trematoda c) Turbularia d) Nematodes
  15. The larva of balanoglossus
    - a) Planule b) Trochophore c) Tornaria d) Veliger
  16. The reproductive zooids of obelia colony
    - a) Hydrotheca b) Perisarc c) Blastostyle d) manubrium
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Differentiate between polyp and medusa
18. Give an account of Gemmules in sponges
19. Write a short note on Archiannelids with examples
20. Comment on the feeding mechanism in paramecium
21. Classify phylum Annelida with examples?
22. Write a short note on Pleurobrachia
23. Write the parasitic adaptations of Fasciola
24. State the significance of Limulus

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Briefly describe on polymorphism in Coelenterates
26. Explain canal systems in sponges
27. Describe the larval stages of Penaeus
28. Write a detailed account of pearl culture
29. Explain conjugation in Paramecium
30. Briefly describe the life cycle of Plasmodium

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Write an essay on pathogenic nematodes
  32. Write an essay on water vascular system of Star fish
  33. Write an essay on life history of Fasciola
- .....

**MAHATMA GANDHI UNIVERSITY**  
**FOURTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY4B04U. ANIMAL DIVERSITY – CHORDATA (course code & course title)**  
**Total weightage: 25**

**Instructions:**

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use .....(type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of four)**

1. Name the class to which oikopleura belongs to  
 a) Ascidiacea b) Thaliacea c) Larvaceae d) Placodermi
2. Example of cyclostomata  
 a) Petromyzon b) Ascidia c) Amphioxus d) Narcine
3. Which of the following is a flying fish?  
 a) Shark b) Exocoetus c) chimera d) Latimeria
4. The animal having wheel organ  
 a) Amphioxus b) Ascidia c) Wheel animalcule d) Salpa
- .....
5. Name an aestivating fish  
 a) Lepidosiren b) Etroplus c) Sardine d) Mugil
6. Name the order comes under Amphibia  
 a) Chiroptera b) Anura c) Chelonia d) Squamata
7. Number of cranial nerves in rabbit  
 a) 10 pairs b) 12 pairs c) 8 pairs d) 14 pairs
8. The first cervical vertebra in mammals  
 a) Axis b) Atlas c) Lumbar vertebra d) Urostyle

- .....
9. Which of the following have placoid scales?
    - a) Sardine b) Exocoetus c) Amia d) Shark
  10. Example of fish having accessory respiratory organ
    - a) Mullet b) Etroplus c) Catla d) Anabas
  11. Name an example of parapsida
    - a) Chelone b) Sphenodon c) Ichthyosaurus d) Cynognatha
  12. Name a poisonous lizard
    - a) Jecko b) Dryophis c) Heloderma d) Varanus

- .....
13. Zebra belongs to the order
    - a) Sirenia b) Cetacea c) Carnivora d) Perissodactyla
  14. The larva of amblystoma
    - a) Oikopleura b) Axolotl c) Planula d) Ascidia
  15. Example of Ratitae
    - a) Kiwi b) Pelican c) Pigeon d) Crow
  16. Name the sucker fish
    - a) Ophiocephalus b) Echeneis c) Mackerel d) Channa
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Write a note on ostracoderm
18. Comment the evolutionary significance of latimeria
19. Mention any two adaptations found in Chameleon
20. Give an account of order Rhyncocephalia
21. Write two general characters of metatheria
22. Mention salient features of order Apoda
23. Write two salient characters of cetacean with an example
24. Mention atrium

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Give an account of lung fishes
26. With the help of a neat labeled diagram explain the structure of brain of rabbit
27. State the affinities of Archaeopteryx
28. Give a detailed account of retrogressive metamorphosis in ascidia
29. Write an essay on identification of poisonous and non poisonous snakes
30. Briefly explain the parental care in fishes

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Explain in detail the dentition in mammals
  32. Write a detailed account of flight adaptations in birds
  33. Give an account on migration in fishes
- .....

**MAHATMA GANDHI UNIVERSITY**  
**FIFTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY5B05U. CELL BIOLOGY & MOLECULAR BIOLOGY (course code & course title)**  
**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**  
**Part A (Objective type. Weight 1 each for a bunch of four)**

1. Smallest organisms are  
 a) Viruses b) Viroids c) Mycoplasmas d) Prions
  2. Fluid mosaic model of cell membrane was proposed by  
 a) Danielli and Davson b) Singer and Nicholson c) Schleidan and Schwann  
 d) Messelson and Stahl
  3. Minute finger shaped projections seen on the surface of cells are  
 a) Microvilli b) Tight junctions c) Desmosomes d) Gap junctions
  4. Protein factories of cells are  
 a) Lysosomes b) Endoplasmic recticulum c) Golgi complex d) Ribosomes
- .....
5. Lysosomes are  
 a) Suicidal bags of cells b) Power house of cells c) Organelle concerned with  
 cell secretion d) Factories of protein synthesis
  6. Chromosomes can be best studied during  
 a) Prophase b) Metaphase c) Anaphase d) Telophase
  7. Crossing over takes place during  
 a) Zygotene b) Pachytene c) Diplotene d) Leptotene

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8. DNA synthesis occurs during  
 a) G<sub>2</sub> phase b) G<sub>1</sub> phase c) S phase d) M phase

- .....
9. Transformation experiment was done by  
 a) Friedrich Miescher b) Alfred D Hershey and Martha Chase c) James Watson and Francis crick d) Frederih griffith

10. Non coding segments of nucleic acid are  
 a) Mutons b) Exons c) Introns d) Recon

11. Which of the following is central dogma in molecular biology?  
 a) mRNA- DNA- Protein b) DNA- mRNA- Protein c) mRNA-Protein- DNA  
 d) Protein- DNA- mRNA

12. Initiation codon is?  
 a) AUG b) UAA c) UAG d) UUU

- .....
13. Reverse transcription is present in  
 a) Bacteria b) DNA viruses c) Mycoplasmas d) Retroviruses

14. Inducer in Lac operon is  
 a) Glucose b) Galactose c) Sucrose d) Lactose

15. One gene one enzyme hypothesis was proposed by  
 a) F.H.C crick b) George Beadle and Edward Tatum c) Francis Jacob and Jacquos Monod d) Messelson and Stahl

16. Which of the following is an example for repressible control?  
 a) Tryptophan operon b) Lac operon c) Stimulon d) Modulon

.....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Define cell theory
18. What is endomitosis?
19. Distinguish between rough and smooth endoplasmic reticulum

20. Comment on synaptonemal complex
21. What are cytokines?
22. What are transposons?
23. Briefly explain symbiont hypothesis
24. Define reverse transcription? Name the enzyme and an example of reverse transcription

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Distinguish between prokaryotic and eukaryotic gene regulation mechanisms
26. Briefly explain the structure and functions of mitochondria
27. Comment on the role of cyclic AMP in cell signalling
28. Explain the nucleosome model of DNA
29. Enumerate the characteristics of genetic code. Add a note on Khorana's contributions
30. Explain tryptophan operon

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Describe the fluid mosaic model of plasma membrane and cell permeability. Add a note on the modifications of plasma membrane
  32. Give an account of structure and functions of interphase nucleus?
  33. Write an essay on protein synthesis
- .....

**ZY5B05U. CELL BIOLOGY & MOLECULAR BIOLOGY**

| <b>Module</b>    | <b>Part A</b> | <b>Part B</b> | <b>Part C</b> | <b>Part D</b> |
|------------------|---------------|---------------|---------------|---------------|
| Part-1 Module 1  | 1             | 1             | 0             | 0             |
| Module 2         | 2             | 0             | 0             | 1             |
| Module 3         | 2             | 2             | 1             | .....         |
| Module 4         | 1             | 1             | 1             | 1             |
| Module 5         | 2             | 1             | .....         | .....         |
| Module 6         | 0             | 1             | 1             | 0             |
| Part- 2 Module 7 | 2             | 1             | .....         | .....         |
| Module 8         | 4             | 1             | 1             | 1             |
| Module 9         | 2             | 1             | 1             | .....         |
| <b>TOTAL</b>     | <b>16</b>     | <b>9</b>      | <b>6</b>      | <b>3</b>      |

**MAHATMA GANDHI UNIVERSITY**  
**FIFTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY5B06U. ENVIRONMENTAL BIOLOGY, TOXICOLOGY & DISASTER**  
**MANAGEMENT (course code & course title). Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of four)**

1. Autecology deals with:
    - a. Study of individual organism
    - b. Study of group of organisms
    - c. Study of autotrophs
    - d. Study of heterotrophs
  2. Largest terrestrial ecological unit is called
    - a. Forest
    - b. Desert
    - c. Biome
    - d. Tundra
  3. World environment day is celebrated on:
    - a. 22<sup>nd</sup> March
    - b. 5<sup>th</sup> June
    - c. 1<sup>st</sup> December
    - d. 16<sup>th</sup> September
  4. Study of freshwater habitat is
    - a. Lithology
    - b. Hydrology
    - c. Pedology
    - d. Limnology
- .....
5. Nektons are:

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- a. Free swimming organisms
  - b. Non- swimming, free floating organisms
  - c. Sedentary organisms
  - d. Flying organisms
6. The following are green house gases
- a. Methane, carbon dioxide, carbon monoxide
  - b. Methane, water vapour, carbon sulphide
  - c. Carbon dioxide, hydrogen sulphide, hydrogen cyanide
  - d. Carbon dioxide, Carbon monoxide, hydrogen cyanide
7. IPCC stands for:
- a. Indian Penal and Criminal Code
  - b. International Peoples Consortium for Climate Change
  - c. Intergovernmental Panel for Climate Change
  - d. International Panel for Climate Change
8. Rio Earth summit was held in:
- a. 1972
  - b. 1982
  - c. 1992
  - d. 2002
- 
9. Which is a non conventional energy resource?
- a. Wind energy
  - b. Tidal energy
  - c. Solar energy
  - d. All the above
10. PET stands for
- a. Poly Ethylene Toludine
  - b. Poly Ethylene Terephthalate
  - c. Ply Ester Terlene
  - d. None of the above
11. The following is not a Ramsar site
- a. Vembanad lake
  - b. Sasthamkotta lake
  - c. Ashtamudi lake
  - d. Periyar lake
12. Epicentre is
- a. Centre point of the earth
  - b. Origin of a earthquake
  - c. Origin of a tornado
  - d. Path of the satellite
- 
13. Minemata disease is caused due to
- a. Mercury poisoning
  - b. Lead poisoning
  - c. Carbon monoxide poisoning

- d. None of the above
14. Wind energy is produced in Kerala at:
- Palghat
  - Vizhinjam
  - Brahmapuram
  - Ramakalmedu
15. Aflatoxins are toxins produced by
- Fungi
  - Viruses
  - Bacteria
  - Protozoa
16. Red Data Book is published by
- IUCN
  - WHO
  - UNEP
  - UNESCO

.....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

- What abiotic factor characterizes a desert ecosystem?
- What is tundra?
- Define hypolemnion.
- What is abyssal zone?
- What is eutrophication?
- What is tsunami?
- What is landslide?
- What is tropical rain forest?

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

- Distinguish between lentic and lotic ecosystem
- What is biological magnification?
- Mention four adaptations of deep sea fauna
- What are the effects of ozone depletion?
- What are the mitigation measures of flood?
- What is savanna? Where does it seen?

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

- Comment on the threats of freshwater pollution with special reference to Kerala
  - What are the deleterious effects of plastics on human health?
  - What are natural hazards? Explain any four.
- .....

**MAHATMA GANDHI UNIVERSITY**  
**FIFTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY5B07U. EVOLUTION, ZOOGEOGRAPHY & ETHOLOGY (course code &**  
*course title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of four)**

1. Golden age of reptiles
  - a. Coenozoic era
  - b. Archaeozoic era
  - c. Mesozoic era
  - d. Palaeozoic era
2. Theory of panspermia is proposed by
  - a. Aristotle
  - b. Oparin and Haldane
  - c. Richter and Arrhenius
  - d. None of the above
3. Life originated first in the primitive oceans. The evidences supporting this view
  - a. Protoplasm and body fluids of all animals contain salt
  - b. Moist simpler and lower animals are aquatic and marine
  - c. Fossils of earliest animals obtained from rocks of marine origin
  - d. All the above
4. The colloidal particles of organic materials formed in the primitive oceans are called
  - a. Coacervates
  - b. Protoplasm
  - c. Cytoplasm
  - d. Nucleic acid
- .....
5. The theory of inheritance of acquired characters are proposed by
  - a. J.B. Lamarck
  - b. Charles Darwin
  - c. Gregor Mendel
  - d. Hugo De vries

6. Who proposed mutation theory
  - a. J.B. Lamarck
  - b. Charles Darwin
  - c. Hugo de vries
  - d. Mendel
  
7. Mammals originated during
  - a. coenozoic era
  - b. Paleozoic era
  - c. Archaeozoic era
  - d. None of the above
  
8. Carbon dating method was developed by
  - a. Willard Libby
  - b. Bolt Wood
  - c. Simpson
  - d. Mayer
  

---

9. The major phenomenon responsible for micro evolution and mega evolution
  - a. Genetic drift
  - b. Adaptative radiation
  - c. Natural selection
  - d. None of the above
  
10. Pheromones seen in male sweat
  - a. X androstenone
  - b. Acetylcholine
  - c. Vasopressin
  - d. Oxytocin
  
11. Gradual reduction in response to a repeated stimulus
  - a. Sensitization
  - b. Habituation
  - c. Conditioning
  - d. Imprinting
  
12. The term socio biology was coined by
  - a. C. F. Hockett
  - b. Darwin
  - c. Mc Carthy
  - d. De vries
  

---

13. Goal oriented behavior is
  - a. Latent learning
  - b. Motivation
  - c. Imprinting
  - d. Conditioned reflex
  
14. Who is father of ethology
  - a. Pavlov

- b. K Lorence
  - c. Mendel
  - d. Darwin
15. Conditional learning was proposed by
- a. Pavlov
  - b. Wilkins
  - c. Watson
  - d. Morgan
16. Which one is an ancient continental island
- a. New Zealand and Madagascar
  - b. Andamans and Nicobar
  - c. Australia
  - d. Ethiopian realm

.....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

- 17. Explain carbon dating.
- 18. What is the importance of archaeopteryx
- 19. What are the salient features of gene mutation
- 20. Explain Lamarckism
- 21. Comment on punctuated equilibrium
- 22. Explain continental drift
- 23. Briefly explain imprinting
- 24. Write notes on territorial behaviour

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

- 25. Explain the theory of natural selection
- 26. What is speciation? Describe different types of speciation
- 27. Give an account on biochemical evolution of life
- 28. How natural selection helps in evolving behaviour?
- 29. Give an account on social organizations in primates
- 30. Describe different types of animal distribution

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

- 31. Explain horse evolution as a typical example of orthogenesis
  - 32. What is hardy Weinberg equilibrium? Give an account on the various factors which upset this equilibrium
  - 33. Write an essay on various types of learning.
- .....

**MAHATMA GANDHI UNIVERSITY**  
**FIFTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION... (Year)**  
**ZY5B08U BIOCHEMISTRY, HUMAN PHYSIOLOGY & ENDOCRINOLOGY**  
*(course code & course title)* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use .....(type of calculator/tables).

Time:3hrs

**Model question paper**  
**Part A (Objective type. Weightage 1 each for a bunch of 4)**

1. What is flatulence?  
 a) Acidity b) Gas formation c) Indigestion d) Dehydration
2. Drinkers method is to test  
 a) Cardiac function b) Renal function c) Lung function d) Liver function
3. In normal blood sample, the most abundant leucocytes are  
 a) Neutrophils b) Basophils c) Eosinophils d) Monocytes
4. The following may cause an elevated blood urea  
 a) Renal disease b) Lung disease c) Heart disease d) Over nutrition
- .....
5. Spike potential is related to .....  
 a) Nephron b) Epithelium c) Muscle d) Neurone
6. The following is a neuroinhibitor  
 a) GABA b) Noradrenaline c) Acetylcholine d) Dopamine
7. Hematocrit measures percentage of  
 a) WBC b) Plasma c) Platelets d) RBC
8. Which of the following is known as animal starch  
 a) Chitin b) Dextrin c) Glycogen d) Starch

- .....
9. The cholesterol molecule is  
a) Aromatic ring b) A straight chain acid c) Tocopherol d) A steroid
10. Conversion of glucose to glycogen is  
a) Glycolysis b) Glycogenesis c) Glycogenolysis d) Glucogenolysis
11. ATP molecules yielded by one molecule of glucose on complete oxidation is  
a) 40 b) 38 c) 48 d) 36
12. The final acceptor of electron in electron transport chain is  
a) Oxygen b) Water c) Cytochrome a d) Cytochrome a<sub>3</sub>
- .....
13. Adolsterone secretion is controlled by  
a) Plasma sodium level b) Plasma calcium level c) Plasma phosphate level  
d) Plasma iron level
14. Antidiuretic hormone is secreted in response to  
a) Light b) Glucose c) Minerals d) Stress & dehydration
15. Cytokine s stimulate the maturation and activation of  
a) T4 and B-lymphocytes b) Platelets c) Retinal cells d) Neurones
16. Melatonin is secreted by  
a) Pineal body b) Thymus gland c) Thyroid gland d) Pancreas
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Give the importance of breast feeding
18. Explain the Haldane effect
19. Describe the fate of RBC
20. Distinguish between glomerular nephritis & Pyelonephritis
21. Distinguish between fats and oils

22. Mention sulphur containing amino acids and acidic amino acids
23. What is a steroid? Give an example
24. Describe the second messenger concept in hormone action

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Describe the biochemical changes during muscle contraction
26. What is Alzheimer's disease?
27. Briefly describe different food capturing methods in invertebrates
28. Explain the biological functions of proteins
29. Why allosteric enzymes regarded as regulating enzymes
30. Explain the hormonal control of homeostasis

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Describe the mechanism of blood clotting in man
  32. Describe the various steps involved in the oxidation of glucose during which Energy is evolved
  33. Explain the biosynthesis, secretion, regulation, functions and disorders of thyroxin
- .....

**ZY5B**

**08U BIOCHEMISTRY, HUMAN PHYSIOLOGY & ENDOCRINOLOGY**

| MODULE       | PART A    | PART B   | PART C   | PART D   |
|--------------|-----------|----------|----------|----------|
| 1            | 1         | 2        | 1        | .....    |
| 2            | 4         | 1        | .....    | <b>1</b> |
| 3            | .....     | .....    | 1        | .....    |
| 4            | .....     | .....    | .....    | .....    |
| 5            | 1         | 1        | .....    | .....    |
| 6            | 1         | 1        | .....    | .....    |
| 7            | 3         | 1        | 1        | 1        |
| 8            | 1         | 1        | .....    | .....    |
| 9            | 1         | 1        | 1        | .....    |
| 10           | 1         | .....    | 1        | .....    |
| 11           | .....     | .....    | .....    | .....    |
| 12           | 1         | 1        | 1        | .....    |
| 13           | 2         | .....    | .....    | 1        |
| <b>TOTAL</b> | <b>16</b> | <b>9</b> | <b>6</b> | <b>3</b> |

**MAHATMA GANDHI UNIVERSITY**  
**SIXTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION...(Year)**  
**ZY6B09U REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY(course code**  
*&course title)* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use .....(type of calculator/tables).

Time:3hrs

**Model question paper**  
**Part A (Objective type. Weightage 1 each for a bunch of 4)**

1. Microlecithal egg is the egg of  
 a) Frog b) Bird c) Insect d) Amphioxus
2. Amphimixis is  
 a) Fission b) Cytogamy c) Syngamy d) Karyogamy
3. Spermatogenesis can be explained as  
 a) Germ layers to sperm b) Spermatid to sperm c) primordial germ cells to sperm  
 d) Polar body to sperm
4. Withdrawal of which of the following hormone is the cause of immediate menstruation  
 a) FSH b) FSH-LH c) Progesterone d) Estrogen
- .....
5. Cleavaged cells  
 a) Micromere b) Blastomere c) Macromere d) Centromere
6. Ontogeny  
 a) Metamorphosis b) Zygote to adult c) Parthenogenesis d) Gametogenesis
7. Teratology is  
 a) Miscarriage and still birth b) Foetal malformalties c) Study of diseases d) abortion

8. Germplasm theory was put forward by  
a) Ernest Haeckel b) Weismann c) Chapmann d) Friedrich wolff
- .....
9. Blastocyst is found in  
a) Amphibian b) Birds c) Mammals d) reptiles
10. Corpus luteum has  
a) Oestrogen b) Androgen c) Progesteron d) Leutenising hormone
11. First cleavage plane is  
a) Vertical b) Meridional c) Radial d) Latitudinal
- .....
12. Teratogen is  
a) Agent causing malformation b) Agent causing disease c) Agent accelerating growth d) Agent causing retardation
13. Vital staining technique in fate map was developed by  
a) Roux b) Malpigi c) Spratt d) vogt
14. Gut is derived from  
a) Mesoderm b) ectoderm c) Endoderm d) Germ cell
15. Number of pairs of somites present in 26hrs chick embryo is  
a) 4 b) 6 c) 8 d) 5
16. Tetrapod with single ovary  
a) Amphibians b) Mammals c) Aves d) Reptiles
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Distinguish between Semination and ovulation
18. Distinguish between Gonochorism and hermaphroditism
19. Distinguish between Arrhenotoky and thelytoky
20. Distinguish between determinate and indeterminate cleavages

21. What is Splanchnopleure?
22. Explain Recapitulation theory
23. What are sertoli cells?
24. What is embryonic induction?

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Explain the significance of fertilization
26. Give the derivatives of germ layers
27. Explain Polarity and symmetry
28. Briefly explain the morphogenetic movements during gastrulation
29. What is organizer and embryonic induction?
30. Give an account of the types of cleavages based on the amount of yolk

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Explain the extra embryonic membranes in mammals
  32. Give an account of placenta in mammals and its functions
  33. Define teratology? Comment on teratogenic agents and mention the various developmental defects
- .....

**ZY6B09U REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY**

| MODULE | PART A | PART B | PART C | PART D |
|--------|--------|--------|--------|--------|
| 1      | 70     | 5      | 2      | .....  |
| 2      | 5      | 3      | 3      | .....  |
| 3      | 1      | 1      | 1      | 2      |
| 4      | 3      | .....  | .....  | 1      |
| TOTAL  | 16     | 9      | 6      | 3      |

**MAHATMA GANDHI UNIVERSITY**  
**SIXTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY6B10U GENETICS & BIOTECHNOLOGY (course code & course title)**

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use .....(type of calculator/tables).

Time: 3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of 4)**

1. Bacterial resistance to antibiotics is contained in the bacterial
  - a) intron b) Chromosome c) Plasmid d) centromere
2. Percentage of recombination between A and B is 9%, A and C is 17%, B and C is 26%, then the arrangement of genes is
  - a) ABC b) ACB c) BCA d) BAC
3. When genes control two or more different characters simultaneously, the phenomenon is called?
  - a) Apomixis b) pleiotropy c) Polyploidy d) polyteny
4. The most commonly used enzyme in polymerase chain reaction is
  - a) Reverse transcriptase b) DNA polymerase c) Taq polymerase d) Klenow fragment

.....
5. When genetic material is changed via cytoplasm between two prokaryotes it is called?
  - a) Conjugation b) Transduction c) Transformation d) Restricted transduction
6. Restriction fragment length polymorphism (RFLPs)
  - a) Identify individuals genetically b) Are the basis for DNA fingerprinting c) Can be subjected to gel electrophoresis d) All the above

7. Which of the following mitotic stages provides the best opportunity for preparing human karyotype?
- a) Anaphase b) Metaphase c) Prophase d) Telophase
8. Individuals affected by klinefelters syndrome are
- a) Males b) Females c) Gynandromorphs d) Both A+B
- .....
9. Extra nuclear inheritance occurs in
- a) Killer strain in paramecium b) Colour blindness c) Phenyl ketonuria  
d) Amphibians
10. Skin colour in humans is an example of
- a) Co-dominance b) Epistasis c) Multiple alleles d) Quantitative inheritance
11. The most striking example of point mutation is formed in a disorder called
- a) Thalassemia b) Night blindness c) Down's syndrome d) Sickle cell anaemia
12. Inherited Rh gene is found in
- a) Rh<sup>+</sup> individuals b) Rh<sup>-</sup> individuals c) AB blood group individuals d) O blood group individuals
- .....
13. Albinism in humans is
- a) Polygenic b) Dominant c) Recessive d) None of the above
14. DNA fingerprinting was discovered by
- a) Allec Jeffry b) Morgan c) Darwin d) M.S Swaminathan
15. Persons having monosomic sex chromosome
- a) Down's syndrome b) Turners syndrome c) Klinefelters syndrome d) Patau's syndrome
16. Restriction endonuclease enzyme helps in
- a) Joining pieces of nucleotides b) DNA synthesis c) RNA synthesis d) Breaking ends of DNA
- .....

**PART B (Any 5)****(Short answer question. Weightage 1 each)**

17. What is a viroid?
18. What are gynandromorphs?
19. What is a nucleoid?
20. What is epistasis?
21. Distinguish between test cross and back cross
22. What is biopiracy?
23. What is pleiotropism?
24. What are kappa particles? Explain its inheritance

**PART C (Any 4)****(Short essay/problem solving type. Weightage 2)**

25. Describe sickle cell anaemia and its clinical manifestations
26. Describe polygenes with a suitable example
27. Describe the applications of biotechnology in human welfare
28. Explain criss- cross inheritance. Mention an example
29. Write briefly DNA finger printing and its applications
30. What is PCR technique?

**PART D (Any 2)****(Essay type. Weightage 4 each)**

31. Explain the mechanism of drug resistance in bacteria
32. Define genetic engineering. Explain the process of rDNA technology
33. Describe any five different types of sex determination mechanism seen in animals

**MAHATMA GANDHI UNIVERSITY**  
**SIXTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY6B11U MICROBIOLOGY & IMMUNOLOGY (course code & course title)**  
**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use .....(type of calculator/tables).

Time: 3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of 4)**

1. Name the enzyme which digest cellulose  
 a) Amylase b) Invertase c) Cellulase d) Sucrase
2. Give the name of the bacteria which hydrolyse the peptic substances in water  
 a) *Clostridium butyricum* b) *E. coli* c) *Lactobacillus lactis* d) *Streptococcus bovis*
3. The study of fungi is named as  
 a) Protozoology b) Limnology c) Mycology d) Pharmacology
4. What is PPLO?  
 a) Pleuropneumonia like organ b) Pleuropneumonia like organism c) Public purity level observation d) Pleuropneumonia level orientation  
 .....
5. Which one is the chain shaped bacteria?  
 a) Diplococci b) Streptococci c) Staphylococci d) Tetracocci
6. Name the protein of the filament in bacteria  
 a) Protoplast b) Flagellum c) Flagellin d) Proteon
7. Bacterial cellwall is made up of  
 a) Peptidoglycan b) Lipopolysaccharide c) Phospholipid d) Glucopolysaccharide

8. Name the smallest virus  
a) Rhiovirus b) Enterovirus c) Parvo virus d) Herpes virus
- .....
9. Name the causative agent of Crutzpeldt-jacob disease  
a) Polio virus b) Viroid c) Prion d) TMV
10. The causative organism of typhoid  
a) Mycobacterium b) Leptospira c) Salmonella d) Herpes
11. The disease caused by candida  
a) Dermatoffitosis b) Polio c) Tetanus d) Candidiasis
12. Vaccine is an example for  
a) Innate immunity b) Active natural c) Active artificial d) Invasive natural
- .....
13. Primary lymphoid organ of human being  
a) Bursa of fabricious b) Bone marrow c) Spleen d) Lymph nodes
14. A cell not involved in cell mediated immunity  
a) T-cell b) NK cell c) Plasma cell d) Mast cell
15. The largest of immunoglobulin  
a) IgA b) IgG c) IgE d) IgM
16. Macrophages are formed from  
a) T lymphocytes b) B lymphocytes c) Monocyte d) Mega karyocyte
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Define nutrient agar
18. What is pour plate culture?
19. Define infection
20. Differentiate bacteraemia from septicaemia
21. What is meant by nosocomial infection?

22. What is acquired immunity?
23. What is epitope and paratope?
24. What is a precipitation test?

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Explain any two techniques of culture preservation
26. Explain the structure of bacterial flagellum
27. What are principles of vaccination? Mention different types of vaccines
28. Distinguish between protoplast and spheroplast
29. What are membrane filters? How do they help in explaining bacterial growth
30. Explain the method of cultivation of animal viruses

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Describe the structure of bacterial cell wall of gram positive and gram negative bacteria. Add a note on the principles and procedures of gram staining
  32. Describe the basic structure of immunoglobulin
  33. What is hybridoma technology? Describe the steps involved in its application for the production of monoclonal antibodies
- .....

**MAHATMA GANDHI UNIVERSITY**  
**SIXTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY6B12U.GENERALINFORMATICS, BIOINFORMATICS AND**  
**BIOSTATISTICS(course code & course title) Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use .....(type of calculator/tables).

Time: 3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of 4)**

01. A hard disk which consists of multiple platters mounted on a central shaft.  
 [a] Winchester disk [b] Bernoulli disk [c] Zip disk [d] Diskette
02. An open source Operating System.  
 [a] Unix [b] Linux [c] MS-DOS [d] Windows XP
03. EPROM microchips.  
 [a] cannot be reprogrammed [b] cannot be programmed  
 [c] can be reprogrammed [d] can be highly volatile
04. Which among the following, is *not* a high level computer programming language?  
 [a] FORTRAN [b] COBOL [c] ALGOL [d] UNIVAC  
 .....
05. Besides cloning and chromosomal localisation what is needed to study the molecular biology of a gene and its product, the protein ?  
 [a] transduction [b] translation [c] sequencing [d] hybridizing
06. Principal driving force in protein- folding pathway.  
 [a] hydrostatic effect [b] hydrophobic effect [c] terminal bonds [d] monovalency
07. Nucleotides differ mainly by their composition of aromatic base structures.  
 [a] purines [b] deoxyriboses [c] riboses [d] hexoses
08. An example of a non-redundant or less redundant nucleotide sequence data base.  
 [a] PDB [b] Genbank [c] dbEST [d] PIR

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 Kottayam

- .....
09. Difference between true upper limit and true lower limit of a class.  
[a] class interval [b] class mark [c] class size [d] class limit
10. Sampling done in a randomly selected group.  
[a] stratified sampling [b] cluster sampling  
[c] systematic sampling [d] simple sampling
11. A moderately peaked distribution.  
[a] leptokurtic [b] platykurtic [c] mesokurtic [d] epikurtic
12. Condition where a variation in one variable has no relation with the variation in the other.  
[a] negative correlation [b] positive correlation  
[c] zero correlation [d] reciprocal correlation
- .....
13. Term given to the interleaved execution of two or more different and independent programs by the same computer.  
[a] multitasking [b] multi programming [c] multi processing [d] multi sharing
14. The Polymerase Chain Reaction was developed in 1985 by :  
[a] Alfred Hershey [b] Victor McKusick [c] Oswald Avery [d] Kary B Mullis
15. A graph of a cumulative frequency distribution drawn by touching the mid apex point of histogram.  
[a] Ogive [b] Ordinate [c] Mantissa [d] Abscissa
16. Test of significance of overall deviation square in observed and expected frequencies , divided by expected frequency.  
[a] Student t Test [b] Z Test [c] Chi Square Test [d] Unpaired t Test
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Mention the features of a computer, which makes it a powerful and useful tool.
18. Name some fourth and fifth generation computers, commenting on their advanced characteristics.
19. What are secondary storage devices of a computer system ? List any four.  
.....
20. Comment on the scope of bioinformatics in biological sciences.
21. What is phylogenetic footprinting ?
22. Give a short note on BLAST and list its variants.  
.....
23. How is the angle derived for various categories, in construction of a pie diagram ?
24. What is SD ? Why is it considered as the best measure of Dispersion ?

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. What is an Operating System ? Mention some popular OS used in computers.
26. Describe the basic and advanced services provided by the Internet, and its uses.  
.....
27. Explain the relevance of genome and proteome analysis in gene therapy.
28. What is neuroinformatics ? Comment on Human Brain Project.

29. Find the Standard Deviation and Coefficient of Variance of gill beats monitored in fresh water mussels in unit time, from the values given below :

11 13 45 57 78 55 66 34 55 74 55 43

30. Following data are the rpm values of a tread mill exercise performed by sixteen albino mice :

153 178 224 153 168 231 218 188  
206 141 134 193 125 166 180 101

Compute the Mean, Median and Mode.

.....

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Write an essay on Input – Out put devices of a computer , emphasizing any three advanced peripheral devices.

32. Compare and contrast, the structure and function of DNA and RNA.

33. What are Tests of significance ? Cite examples. Give a brief account on laying down hypothesis , for the procedure for carrying out such a test.

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**MAHATMA GANDHI UNIVERSITY**  
**SIXTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY6B13U. ECOTOURISM (course code & course title).**

**Total weightage: 25**

**Instructions:**

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of four)**

1. Heavy use of pesticides is the most serious environmental hazard caused by the following tourist spot:
    - a. Water theme park
    - b. Beaches
    - c. Golf course
    - d. Villages
  2. Soft tourism means :
    - a. Tourism to soft corners of earth
    - b. Of tourists who are soft and with good habits
    - c. Which would impact less on the society and environment of the host country
    - d. Tourism to spiritual centres
  3. Ecotourism is the tourism
    - a. Which allows the rational use of biological diversity and can contribute to the preservation of that diversity.
    - b. In which the developmental activities must be controlled and carefully managed
    - c. All the above
    - d. Non of the above
  4. Energy audit is an essential tool for energy conservation and it means
    - a. Audit of energy production and utilization
    - b. Audit of energy expenditure
    - c. Audit of economic benefits through conservation
    - d. None of the above
- .....
5. World Tourism day is celebrated on:
    - a. September 27
    - b. February 28
    - c. June 20

- d. November 9
6. India gate is at
- Mumbai
  - Delhi
  - Calcutta
  - Chennai
7. Shivrathri is celebrated throughout India during
- January
  - February
  - March
  - April
8. Baisakhi festival celebrated in which Indian state?
- Bihar
  - Maharashtra
  - Punjab
  - Haryana
- 
9. Asia's largest cattle fair is at
- Pushkar
  - Sonepur
  - Sarkhej
  - Madurai
10. Bandipur National park is in which state?
- Karnataka
  - Tamil nadu
  - Kerala
  - None of the above
11. Periyar lake and its surroundings inside Periyar Tiger Reserve comes under:
- Buffer zone
  - Core zone
  - Tourism zone
  - None of the above
12. The conventional tourism is
- Economically good but ecologically harmful
  - Both economically and ecologically good
  - Ecologically good but economically bad
  - All the above
- 
13. Amarnath is famous for
- Pilgimage tourism
  - Adventure tourism
  - Village tourism
  - None of the above
14. Edakkal cave is located at

- a. Wayanad
  - b. Silent valley
  - c. Mangaladevi
  - d. Koorg
15. Kerala Kalamandalam is a major centre for learning Indian performing arts. Where is it located?
- a. Chruthuruthy in Thrissur district
  - b. Manjeri in Malapuram
  - c. Beypore in Kozhikode
  - d. Mala in Thrissur district
16. Which of the following is not a national park?
- a. Eravikulam
  - b. Silent valley
  - c. Thattekkadu
  - d. Kanha

.....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is responsible tourism? What is the major difference of it from conventional tourism?
18. Give any four ecologically negative characteristics of tourism
19. What are the typical features of cultural tourism?
20. Briefly describe the characteristics of an eco-tourist.
21. Describe about any one eco-tourism destination in India.
22. Enumerate the major features that make a natural spot attractive for tourists.
23. Describe briefly the emergence of backwater tourism in Kerala.
24. Briefly narrate the history of tourism.

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Explain the major features of sustainable tourism with examples.
26. What are the benefits of tourism?
27. State the visitor management strategies of an eco-tourism destination.
28. Adventure tourism is an emerging trend. Explain its major features of attraction.
29. Describe briefly the impacts of tourism on children and women.
30. Comment major impacts of tourism on fragile environments of Munnar.

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Sustainable tourism –Illusion or realistic alternative? Discuss.
  32. Describe the benefits and negative impacts of wildlife tourism.
  33. Who are eco-tourism guides? Explain the capabilities and skills required for an eco-tourism guide. Add a brief note on their job prospects.
- .....

**MAHATMA GANDHI UNIVERSITY**  
**SIXTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY6B14U. NUTRITION, COMMUNITY HEALTH AND SANITATION (course**  
*code & course title).* **ELECTIVE 2. Total weightage: 25**

Instructions:

3. Time allotted for the examination is 3 Hours
4. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of 4)**

1. DRV ( Dietary reference values ) are
  - a) EAR (Estimated Average Requirement) b) RDA (Recommended Dietary Allowance) c) RNI (Reference Nutrient Intake d) All the above
2. Dietary carbohydrates fall into following main groups
  - a) Sugars, starch & non polysaccharide dietary fibres
  - b) Sucrose, lactose & galactose
  - c) Fatty acids, amino acids & lactic acids
  - d) All the above
3. A major constituent of brain and retinal phospholipids
  - a) Docosahexaenoic acid b) Acetic acid c) Lactic acid d) Propionic acid
4. Vitamin E is a
  - a) Fat soluble antioxidant b) Water soluble antioxidant
  - c) Both a & b d) None of the above

.....
5. Rickets and osteomalacia results from
  - a) Inadequate supply of vitamin D and low availability of calcium from diet
  - b) Inadequate supply of vitamin A and low availability of potassium from diet

- c) Deficiency of vitamin B and vitamin A  
 d) None of the above
6. The following vitamins are regarded as toxic when consumed in excess  
 a) A, D & B6 b) B & C c) Thiamine & folic acid d) None of the above
7. Pernicious anaemia is due to  
 a) Failure to absorb B12 b) Failure to absorb vitamin A c) Failure to absorb vitamin C d) None of the above
8. Dental caries is caused by  
 a) *Streptococcus mutans*, *Lactobacillus* & *Actinomyces viscosus*  
 b) *Aeromonas hydrophila* & *E. coli*  
 c) *Pseudomonas aeruginosa* & *vibrio*  
 d) All of the above
- .....
9. Malaria is transmitted through  
 a) Female culex mosquito b) Female anopheles mosquito c) Female aedes mosquito d) None of the above
10. Chikungunya is a  
 a) Bacterial disease b) Viral disease c) Fungal infection d) None of the above
11. Earthworms used in vermi composting  
 a) *Eisenia foetida*, *Perionyx excovatus*, *Eudrilus eugineae*  
 b) *Pheretima posthuma* & *Megascolex mauritius*  
 c) *Bombyx mori* & *Apis indica*  
 d) None of the above
12. BMI is calculated as  
 a) Weight in Kg/ height in M<sup>2</sup> b) height in M<sup>2</sup>/ Weight in Kg  
 b) Weight in Kg × height in M<sup>2</sup> c) Weight in Kg + height in M<sup>2</sup>
- .....

13. Diabetes is disease in which
- a) The body cannot produce insulin or the body cannot use insulin properly
  - b) The body cannot produce thyroxine
  - c) Due to excessive production of insulin
  - d) None of the above
14. By international agreement, diseases that are quarantinable are
- a) Small pox, cholera, plague, yellow fever, typhoid fever & relapsing fever
  - b) Diabetes, cardiovascular disorders & Dengue fever
  - c) Chikungunya, Malaria & Filariasis
  - d) All the above
15. Psychoneuro immunology deals with
- a) Chemical links between the brain and the immune system
  - b) Chemical links between the heart and the immune system
  - c) Chemical links between all the body parts
  - d) All the above
16. Nyctalopia is due to the deficiency of
- a) Vitamin A
  - b) Riboflavin
  - c) Vitamin C
  - d) Vitamin K
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is balanced diet?
18. Define health
19. What is botulism?
20. Explain food infection
21. What are vector borne diseases?
22. What are hypokinetic diseases?
23. Briefly state salmonellosis

24. What is BMI? How it can be calculated

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Explain water borne and food infection diseases.
26. What is psychoneuroimmunology? Explain its development in modern Sciences
27. Briefly explain the role of yoga and meditation in the well being of human beings
28. List a few vector borne diseases spread through mosquitoes, Give the preventive measures
29. Explain the process of vermicomposting
30. Briefly explain the rodent control measures, that can be adopted in our state

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Explain the method of waste water treatment and disposal
32. What are emerging pathogens and diseases; explain the important factors in the emergence of a potential pathogen. Indicate general and specific methods for the control of emerging infectious diseases
33. Explain the dangers of alcoholic and drug abuse. Add a note on medico-legal implications

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**MAHATMA GANDHI UNIVERSITY**  
**SIXTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY6B15U. APPLIED ENTOMOLOGY, MANAGEMENT OF ORNAMENTAL**  
**FISHBREEDING, VERMICULTURE & BEE KEEPING (course code & course**  
**title). ELECTIVE 3. Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of four)**

1. The scientific name of European honey bee is  
 (a) *Apis dorsata* (b) *Apis mellifera* (c) *Apis indica* (d) *Trogon irridipennis*
  2. In honey bees, pollen basket is present in  
 (a) worker (b) queen (c) drone (d) all of them
  3. In honey bees royal jelly is secreted by  
 (a) worker (b) drone (c) queen (d) all of them
  4. In bee keeping, the presence of eaten away combs and silken web over the comb is indicative of the attack of  
 (a) wax moth (b) wax beetle (c) brood disease (d) fungal disease
- 
- 5 Type of earth worm ideal for vermicomposting is  
 (a) endogeic species (b) anecic species (c) epigeic species (d) all of them
  6. *Eisenia foetida* and *Eudrilus eugeniae* are  
 (a) endogeic species (b) epigeic species (c) anececic species (d) non descript type
  - 7 This one is a live fish bearer  
 (a) gold fish (b) koi carp (c) zeba danio (d) guppy
  8. The provision for placing the breeding fishes for spawning is called  
 (a) Breeding happa (b) nursery pond (c) rearing pond (d) stocking pond

9. This one is a pest of coconut  
 (a) *Leptocorisa acuta* (b) *Spodoptera mauritia* (c) *Tribolium castaneum* (d) *Rhynchophorus ferrugineus*
10. Coconut farm appears to be affected by a wild fire. This is mainly due to the attack of  
 (a) *Oryctes rhinoceros* (b) *rhynchophorus ferrugineus* (c) *nephantis serinopa* (d) *leptocorisa acuta*
11. *Tribolium castaneum* is a  
 (a) beetle (b) moth (c) butter fly (d) bug
12. *Aceria guerreron* is the scientific name of  
 (a) Mandari (b) red palm weevil (c) rice bug (d) wheat weevil
- 
13. In earth worm, clitellum is associated with  
 (a) feeding (b) excretion (c) reproduction (d) respiration
14. Cotton wool disease affects  
 (a) fishes. (b) Earth worms (c) honey bees (d) silk worms
15. Biological filtration is employed in aquarium for  
 (a) Providing more oxygen (b) oxidizing the waste materials aerobically (c) producing required temperature (d) both (a) & (b)
16. Clown fishes are  
 (a) Fresh water forms (b) brackish water forms (c) marine forms (d) super saline forms
- 

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What are queen cells in bee keeping?
18. What is swarming?
19. What is apitherapy?
- 20 Name a larval parasite of *Nephantis serinopa*.
21. What is fumigation?
22. What is vermiwash?
23. Name one ornamental fish endemic to Kerala.
24. Name one viral infection of ornamental fishes.

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Write a note on the management of honey bees during monsoon and summer season.
26. Describe the structural adaptations in honey bees.
27. Write a brief account on the damage, symptoms and control measures caused by *Sitophilus oryzae*, and its control measures
28. Describe the breeding procedure in gold fish.
29. Briefly describe the chemical composition , trade names and mode of action of common pesticides
30. Briefly describe the tips for the successful production of ornamental fishes

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. What is IPM? Describe the different physical, chemical and biological control methods of pest control
32. In your house, the kitchen waste pollutes the surrounding. How can you convert it into an ecofriendly product practising vermiculture?
33. Describe the different diseases of aquarium fishes.

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**ZY6BCB03U. APPLIED ENTOMOLOGY, MANAGEMENT OF  
ORNAMENTAL FISHBREEDING, VERMICULTURE & BEE KEEPING**

| MODULE | PART A | PART B | PART C | PART D |
|--------|--------|--------|--------|--------|
| 1      | 4      | 2      | 2      | 1      |
| 2 & 3  | 5      | 3      | 3      | 1      |
| 4      | 3      | 1      | .....  | 1      |
| 5      | 4      | 3      | 2      | .....  |
| TOTAL  | 16     | 9      | 6      | 3      |

# **OPEN COURSE FOR OTHER STREAMS**

**OPEN COURSE FOR OTHER STREAMS**

**MAHATMA GANDHI UNIVERSITY**

**FIFTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**

**ZY5D01U. MAN, NATURE AND SUSTAINABLE DEVELOPMENT (course  
code & course title). ELECTIVE 1. Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of 4)**

1. Human beings belongs to which order in Class Mammalia.
    - a. Carnivora
    - b. Chiroptera
    - c. Primata
    - d. None of the above
  2. In which epoch Man appeared on earth?
    - a. Oligocene
    - b. Miocene
    - c. Pleistocene
    - d. Pliocene
  3. The scientific name of Man is
    - a. *Homo habilis*
    - b. *Homo intelligensis*
    - c. *Homo erectus*
    - d. *Homo sapiens*
  4. The term Landscape stands for
    - a. A group of interacting ecosystems
    - b. Independent units of the biosphere
    - c. Different ecosystems
    - d. Terrestrial ecosystem
- .....
5. Name the predominant light capturing molecules in plants
    - a. Anthocyanin
    - b. Chlorophyll
    - c. Myosin
    - d. Erythrocyanin

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Kottayam

6. The percentage of oxygen in the atmosphere
- 18.5%
  - 15.0%
  - 22.4%
  - 20.94%
7. Limnology is the study of
- Oceans
  - Deserts
  - Mountains
  - Freshwater
8. The population of India as per 2001 census
- 105.84crore
  - 115.52crore
  - 102.70 crore.
  - 107.30crore
- .....
9. The author of *Ecological Imperialism*
- Arthur Conan Doyle
  - Charles Dickens
  - Noam Chomsky
  - A.W. Crosby
10. Number of biodiversity hotspots in the world
- 12
  - 25
  - 34
  - 28
11. International day for the preservation of Ozone layer
- 16 September
  - 21 September
  - 15 October
  - 16 November
12. The Kyoto Protocol is for
- limiting Green house gases
  - Ozone depleting substance
  - Reducing acid rain
  - None of the above
- .....
13. Who proposed the idea of Deep Ecology?
- Native Americans
  - Thoreau
  - Arne Ness
  - Vandana Shiva
14. The Earth summit 1992 is popularly known as
- Tokyo summit
  - Rio Summit
  - New Delhi Summit
  - Johannesburg Summit
15. The “Wild life Protection Act” was enacted in
- 1986
  - 1972
  - 2002

- d.2004
16. WCED stands for
- World Council of Ecology and Development
  - World Committee for Economic Development
  - World Center for Economy and Deregulation
  - World Commission on Environment and Development

.....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

- Briefly describe the major physical changes in the evolutionary history of man.
- Comment on water cycle.
- What are the salient features of modern agriculture?
- What is oil spill? Give an example.
- Distinguish between eco-spirituality and eco-theology
- Discuss the contributions of Rachel Carson for creating environmental awareness.
- What are the achievements of UN Conference on Man and Environment -1972
- Write the major features of Agenda 21.

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

- Describe the various fossils in the evolution of Man
- Comment on tropical forests and their role in human welfare.
- Discuss the growth of human population and its ecological significance.
- Comment on renewable and non-renewable resources.
- What is acid rain? How it affects the environment?
- Comment on UNFCCC and IPCC

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

- Why water is regarded as the “elixir of life”? Discuss.
  - Describe the importance of biodiversity with examples
  - Discuss how the concept of sustainable development emerged and where it stands now?
- .....

**OPEN COURSE FOR OTHER STREAMS**  
**MAHATMA GANDHI UNIVERSITY**  
**FIFTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZY5D02U HUMAN GENETICS, NUTRITION, COMMUNITY HEALTH AND**  
**SANITATION (course code & course title). ELECTIVE 2.**  
**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of 4)**

1. DRV ( Dietary reference values ) are
  - a) EAR (Estimated Average Requirement) b) RDA (Recommended Dietary Allowance) c) RNI (Reference Nutrient Intake d) All the above
2. Dietary carbohydrates fall into following main groups
  - a) Sugars, starch & non polysaccharide dietary fibres
  - b) Sucrose, lactose & galactose
  - c) Fatty acids, amino acids & lactic acids
  - d) All the above
3. A major constituent of brain and retinal phospholipids
  - a) Docosahexaenic acid b) Acetic acid c) Lactic acid d) Propionic acid
4. Vitamin E is a
  - a) Fat soluble antioxidant b) Water soluble antioxidant
  - c) Both a & b d) None of the above

.....

5. Rickets and osteomalacia results from
  - a) Inadequate supply of vitamin D and low availability of calcium from diet

- b) Inadequate supply of vitamin A and low availability of potassium from diet  
c) Deficiency of vitamin B and vitamin A  
d) None of the above
6. The following vitamins are regarded as toxic when consumed in excess  
a) A, D & B6 b) B & C c) Thiamine & folic acid d) None of the above
7. Pernicious anaemia is due to  
a) Failure to absorb B12 b) Failure to absorb vitamin A c) Failure to absorb vitamin C d) None of the above
8. DNA fingerprinting was discovered by  
a) Allec Jeffry  
b) T.H Morgan  
c) Mullar  
d) Watson and Crick
- .....
9. Malaria is transmitted through  
a) Female culex mosquito b) Female anopheles mosquito c) Female aedes mosquito d) None of the above
10. Chikungunya is a  
a) Bacterial disease b) Viral disease c) Fungal infection d) None of the above
11. Down's syndrome in man is due to  
a) 47 chromosomes instead of 46  
b) 45 chromosomes instead of 46  
c) Deficiency of vitamins  
d) Deficiency of hormones
12. BMI is calculated as  
a)  $\text{Weight in Kg} / \text{height in M}^2$  b)  $\text{height in M}^2 / \text{Weight in Kg}$   
b)  $\text{Weight in Kg} \times \text{height in M}^2$  c)  $\text{Weight in Kg} + \text{height in M}^2$
- .....

13. Diabetes is disease in which
- a) The body cannot produce insulin or the body cannot use insulin properly
  - b) The body cannot produce thyroxine
  - c) Due to excessive production of insulin
  - d) None of the above
14. By international agreement, diseases that are quarantinable are
- a) Small pox, cholera, plague, yellow fever, typhoid fever & relapsing fever
  - b) Diabetes, cardiovascular disorders & Dengue fever
  - c) Chikungunya, Malaria & Filariasis
  - d) All the above
15. Psychoneuroimmunology deals with
- a) Chemical links between the brain and the immune system
  - b) Chemical links between the heart and the immune system
  - c) Chemical links between all the body parts
  - d) All the above
16. Nyctalopia is due to the deficiency of
- a) Vitamin A
  - b) Riboflavin
  - c) Vitamin C
  - d) Vitamin K
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is balanced diet?
18. Define health
19. What is botulism?
20. What is sickle cell anaemia?
21. What are vector borne diseases?
22. What are hypokinetic diseases?
23. What is Amniocentesis?

24. What is BMI? How it can be calculated

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Explain water borne and food infection diseases.
26. What is psychoneuroimmunology? Explain its development in modern Sciences
27. Briefly explain the role of yoga and meditation in the well being of human beings
28. List a few vector borne diseases spread through mosquitoes, Give the preventive measures
29. Explain the process of vermicomposting
30. What are the human blood groups? Explain the inheritance pattern. Add a note on the Rh factor

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Explain the method of waste water treatment and disposal
  32. Briefly explain Any 6 genetic disorders in man. Explain the role of genetic Counselling in the well being of human beings
  33. Explain the dangers of alcoholic and drug abuse. Add a note on medico-legal Implications
- .....

**OPEN COURSE FOR OTHER STREAMS**

**MAHATMA GANDHI UNIVERSITY  
FIFTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ...  
(Year)**

**ZY5D03U. MANAGEMENT OF ORNAMENTAL FISH BREEDING,  
RABBIT FARMING, POULTRY QUAIL FARMING, VERMICULTURE &  
BEE KEEPING & SERICULTURE (course code & course title). ELECTIVE**

**3.**

**Total weightage: 25**

**Instructions:**

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of four)**

1. The scientific name of European honey bee is  
(a) *Apis dorsata* (b) *Apis mellifera* (c) *Apis indica* (d) *Trogon irridipennis*
2. In honey bees, pollen basket is present in  
(a) worker (b) queen (c) drone (d) all of them
3. In honey bees royal jelly is secreted by  
(a) worker (b) drone (c) queen (d) all of them
4. In bee keeping, the presence of eaten away combs and silken web over the comb is indicative of the attack of  
(a) wax moth (b) wax beetle (c) brood disease (d) fungal disease

---

5 Type of earth worm ideal for vermicomposting is  
(a) endogeic species (b) anecic species (c) epigeic species (d) all of them

6. *Eisenia foetida* and *Eudrilus eugeniae* are  
(a) endogeic species (b) epigeic species (c) anececic species (d) non descript type

7 This one is a live fish bearer  
(a) Gold fish (b) kopi carp (c) zebra danio (d) guppy

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8. The provision for placing the breeding fishes for spawning is called  
 (a) Breeding happa (b) nursery pond (c) rearing pond (d) stocking pond

---

9. Grey giant, soviet chinchilla & white giant are different breeds of  
 (a) Ornamental fishes (b) quail (c) poultry (d) rabbit

10. Gestation period in rabbit is  
 (a) 40-43 days (b) 28-34 days (c) 60-63 days (d) 50-53 days

11. Scientific name of mulberry silk worm is  
 (a) *Antheraea assamensis* (b) *Antheraea paphia* (c) *Philosoma ricini* (d) *Bombyx mori*

12. The number of moulting by silk worm is  
 (a) Two (b) three (c) four (d) five

---

13. In sericulture, the disease caused by *Nosema bombycis* is called  
 (a) Pebrine (b) Muscardine (c) Flacherie (d) grasserie

14. In poultry, the chicks spread out under the brooder unevenly and crowded along the wall. It indicates  
 (a) Optimum temp. (b) Temp. High under the hover (c) temp. Lower under the hover  
 (d) no relation with temp.

15. Biological filtration is employed in aquarium for  
 (a) Providing more oxygen (b) oxidizing the waste materials aerobically (c)  
 producing required temperature (d) both (a) & (b)

16. Clown fishes are  
 (a) Fresh water forms (b) brackish water forms (c) marine forms (d) super saline forms

---

### **PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What are queen cells in bee keeping?
18. What is swarming?
19. What is apitherapy?
20. In silk worms, silk glands are the modified --- (name the gland / structure)
21. What is brushing in sericulture?
22. What is vermiwash?
23. What is debeaking in poultry?
24. Hutches are used in rabbit farming. What is the advantage?

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Give a note on the management of honey bees during monsoon and summer season.
26. Write a brief account on quail farming.
27. In a group of rabbit, falling of hairs in patches resulting in areas of baldness is noticed. What is the reason? What is the remedy?
28. Describe the breeding procedure in gold fish.
29. Write a note on artificial brooding in poultry.
30. Give a short account on moriculture.

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Describe the management practices in a sericulture unit.
32. In your house, the kitchen waste pollutes the surrounding. How can you convert it into an ecofriendly product using vermiculture?
33. Describe the different diseases of aquarium fishes.

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**OPEN COURSE FOR OTHER STREAMS  
MAHATHMA GANDHI UNIVERSITY  
FIFTH SEMESTER  
ZY 5 D 04 U – FOOD MICROBIOLOGY  
Total weightage: 25**

**Instructions:**

1. Time allotted for the Examination is 3Hours
2. Answer all questions in part A . This contains 4 bunches of 4 objective type Questions. For each bunch ,Grade A will be awarded if all the 4 answers are Correct, B for 3,C for 2,D for 1,and E for 0 .  
Answer any 5 questions from part B, any 4 from part C and any 2 from part D.

Time : 3hrs

**Model question paper**

**Part A** (Objective type. Weightage 1 for each bunch of four)

1. Microorganisms grow above 40° C are called
  - a. Psychrophiles
  - b. Osmophiles
  - c. Mesophiles.
  - d. Thermophiles.
2. Example for food poisoning disease.
  - a. Botulism
  - b. Anthrax
  - c. Diphtheria
  - d. Pneumonia.
3. Aflatoxin is produced by
  - a. *Aspergillus*
  - b. *Klebsiella*
  - c. *E.coli*
  - d. *Pencillium*
4. Colicin is a bacteriosin produced by
  - a. *Clostritium botulinum*
  - b. *E.coli*
  - c. *Corynebacterium diphtheriae*
  - d. *Staphyloccus aureus*.

5. A chemical preservative is
    - a. Propionates
    - b. Benzoates
    - c. Woodsmoke
    - d. All the above
  6. A method for the removal of microorganisms from food
    - a. Filtration
    - b. Packaging
    - c. Chemical preservation
    - d. Drying
  7. A proper method for asepsis
    - a. Drying
    - b. Centrifugation
    - c. Anaerobic condition
    - d. Packaging
  8. Yeast propagated essentially for food purposes is known as
    - a. Fodder Yeast
    - b. Food Yeast
    - c. Agricultural Yeast
    - d. SCP

---

  9. Baker's Yeast is a strain of
    - a. *Saccharomyces cerevisiae*
    - b. *Pencillium notatum*
    - c. *Candida utilis*
    - d. *Aspergillus*
  10. Toxin produced by *Staphylococcus aureus*
    - a. Neurotoxin
    - b. Enterotoxin
    - c. Aflatoxin
    - d. Ochratoxin
  11. TA spoilage is caused by
    - a. *Clostridium botulinum*
    - b. *Clostridium thermosacharolyticum*
    - c. *Yersinia enterocolitica*
    - d. *Bacillus cereus*
  12. Back spot in meat is caused by
    - a. *Cladosporium herbarum*
    - b. *Thamnidium elegans*
    - c. *Mucor mucedu*
    - d. *Mucor recemosus*
-

13. Pink mold rot in vegetables is caused by
- Trichothecium roseum*
  - Trichoderma*
  - Pencillium digitatum*
  - Rhizopus stolonifer*
14. Procedure after drying
- Peeling
  - Blanching
  - Sweating
  - Sulphuring
15. A pink or reddish liquid comes from meat on thawing
- Metacryotic liquid
  - Bleeding
  - Leakage
  - Freezerburn
16. Causative agent of Q-Fever
- Coxiella burnetti*
  - Clostridium botulinum*
  - Yersinia enterocolityca*
  - Shigella*
- 

**PART B (Any 5)**

(Short answer Question . Weightage 1 each)

- Briefly explain about GRAS?
- Asepsis.
- Treatment of food before and after drying ?
- Water activity .
- Industrially important molds?
- Spoilage of fruits and vegetables ?
- Heat treatments employed in the processing food?
- Preservation of milk?

**PART C (Any 4)**

(Short essay ,Weightage 2 each)

- Explain about canning ?
- Describe single cell protein ?
- Explain general types of spoilage of meat and meat products ?
- Describe HACCP ?
- Write notes on fermented diary products ?
- Microbiological criteria for food ?

**PART D (Any 2)**

(Essay type. Weightage 4 each)

31. Describe various food additives?
32. Explain bacterial food borne diseases ?
33. Give a detailed account on factors affecting the growth of microorganisms in food ?

**MAHATMA GANDHI UNIVERSITY**  
**FIRST SEMESTER B.Sc ZOOLOGY PROGRAMME. COMPLEMENTARY**  
**COURSE MODEL I. ZY1C01U. ANIMAL DIVERSITY - NON CHORDATA**  
*(course code & course title)* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of 4)**

1. Name the pathogen responsible for malaria  
 a) Entamoeba b) Plasmodium c) Nosema d) Opalina
2. Point out the phylum to which Trypanosoma belongs to  
 a) Kinetoplasma b) Ciliophora c) Apicomplexia d) Rhizopoda
3. Slipper animalcule  
 a) Euglena b) Paramecium c) Opalina d) Amoeba
4. Who proposed five kingdom classification?  
 a) Aristotle b) Whittaker c) Haeckal d) Linnaeus
- .....
5. Internal buds of sponges produced during adverse conditions  
 a) Archaeocytes b) Osculum c) Micropyle d) Gemmule
6. Cnidoblast are found in  
 a) Cnidaria b) Protista c) Porifera d) Placozoa
7. Liver rot is caused by

- a) Ascaris b) Fasciola c) Planaria d) Bipalium
8. Taenia belongs to class  
a) Cestoda b) Nematoda c) Trematoda d) Turbellaria
- .....
9. Vector of filariasis  
a) Anopheles b) Culex c) Tse-tse fly d) Mites
10. Locomotory organ in nereis  
a) Parapodia b) Tentacles c) Cilia d) Flagella
11. Connecting link between Annelida and Arthropoda  
a) Nereis b) Limulus c) Peripatus d) Pheretima
12. Green gland is associated with  
a) Excretion b) Nutrition c) Defence d) Respiration
- .....
13. A mollusc with internal shell  
a) Nautilus b) Pila c) Sepia d) Chiton
14. Sensory cephalic tentacles in Dentalium  
a) Byssus thread b) Radula c) Capticula d) Osphredia
15. Larval stage of hemichordata  
a) Veliger b) Tornaria c) Trochophore d) Glochidium
16. Respiratory tree of sea cucumber is located at  
a) Mouth b) Cloaca c) Stomach d) Ambulacral groove
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What are choanocytes?  
18. What is polymorphism?  
19. Comment on clitellum

20. Give the structure of Scolex of taenia solium
21. Comment on radula
22. Give the functions of tube feet
23. Explain the asconoid canal system in sponges
24. Explain the sexual dimorphism in ascaris

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. What are coral reefs?
26. Give the salient features of phylum Echinodermata
27. Write short notes on any two symbiotic protists
28. Comment on different types of coelom
29. Write the parasitic adaptations of leech
30. Comment on larval stages of Penaeus

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Give an account on insect pests
  32. Explain the life cycle of plasmodium
  33. Give the structure and functions of prawn appendages
- .....

**ZY1C01U. ANIMAL DIVERSITY - NON CHORDATA**

| <b>Module</b> | <b>Part A</b> | <b>Part B</b> | <b>Part C</b> | <b>Part D</b> |
|---------------|---------------|---------------|---------------|---------------|
| 1             | 1             | .....         | .....         | .....         |
| 2             | 3             | 1             | 1             | 1             |
| 3             | 1             | 2             | .....         | .....         |
| 4             | 1             | 1             | 1             | .....         |
| 5             | 2             | 1             | .....         | .....         |
| 6             | 1             | 1             | .....         | .....         |
| 7             | 2             | 1             | 2             | .....         |
| 8             | 1             | .....         | 1             | 2             |
| 9             | 2             | 1             | .....         | .....         |
| 10            | 1             | 1             | 1             | .....         |
| 11            | 1             | .....         | .....         | .....         |
| <b>TOTAL</b>  | <b>16</b>     | <b>9</b>      | <b>6</b>      | <b>3</b>      |

**MAHATMA GANDHI UNIVERSITY**  
**SECOND SEMESTER B.Sc ZOOLOGY PROGRAMME . COMPLEMENTARY**  
**COURSE MODEL I . ZY2C02U. ANIMAL DIVERSITY- CHORDATA**  
*(course code & course title)* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of 4)**

1. Tusk of elephant are modifications of the  
 a) Skull b) Incisor c) Canines d) Proboscis
2. ——— is an egg laying mammal  
 a) Elephant b) Shrew c) Echidna d) Archaeopteryx
3. Generic name of cobra  
 a) Naja b) Viper c) Natric D) Dryophis
4. Name one reptilian coming under parapsida  
 a) Chelone b) Ichthyosaurus c) Varanus d) Ichthyophis
- .....
5. Birds are glorified ———  
 a) Aves b) Struthio c) Reptiles d) None of these
6. Ammocoetus is the larva of  
 a) Petromyzon b) Eel c) Crab d) Prawn
7. Bufo belongs to the order  
 a) Apoda b) Anura c) Urodela d) Parapsida
8. Notochord is found in the tail region of  
 a) Chordata b) Urochordata c) Cephalochordata d) Vertebrata
- .....

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9. Number of vertebra in frog  
a) Nine b) Eight c) Ten d) Seven
10. Dryophis is adapted for —— life  
a) Volant b) Aquatic c) Arboreal d) Areal
11. Syrinx is found in  
a) Mammals b) Fishes c) Birds d) Reptiles
12. Flightless birds found in Australia  
a) Emu b) Kiwi c) Ostrich d) Crow
- .....
13. Sucker of suckerfish is a modified  
a) Dorsal fin b) Ventral fin c) Pectoral fin d) Pelvic fin
14. Lycodon is a  
a) Non poisonous snake b) Extinct reptile c) Egg laying mammal  
d) Chondrichthyes
15. Nasika batrachus saliyadreus is a  
a) Reptile b) Bird c) Amphibian d) Mammal
16. Name the order that comes under amphibian  
a) Chiroptera b) Anura c) Chelonia d) Squamata
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What are the salient features of primates?
18. Explain zoological importance of Archaeopteryx
19. Write notes on latimeria
20. Classify super class pisces into orders
21. Bring out the differences between diapsidan and anapsidan skull
22. Describe the functions of swim bladder
23. Describe amphicoelous vertebra of frog

24. Explain neoteny with examples

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Describe the adaptive measures for flight in birds
26. Give the general characters of class Amphibia
27. Classify class amphibian up to orders, giving one example for each
28. Comment on the general characters of chordates
29. Briefly explain hyoid apparatus in frog
30. With the help of a labeled diagram explain the brain of frog

**PART D (Any 2)**

**(Essay type. Weightage 4)**

31. Write an essay on aquatic mammals
32. With the help of diagrams explain the method of identification of poisonous and non poisonous snakes of kerala
33. Explain the accessory respiratory organs in fishes

.....

**ZY2C02U. ANIMAL DIVERSITY - CHORDATA**

| <b>Module</b> | <b>Part A</b> | <b>Part B</b> | <b>Part C</b> | <b>Part D</b> |
|---------------|---------------|---------------|---------------|---------------|
| 1             | 1             | .....         | 1             | .....         |
| 2             | 2             | 3             | .....         | 1             |
| 3             | 3             | 3             | 4             | .....         |
| 4             | 5             | 1             | .....         | 1             |
| 5             | 3             | 1             | 1             | .....         |
| 6             | 2             | 1             | .....         | 1             |
| <b>TOTAL</b>  | <b>16</b>     | <b>9</b>      | <b>6</b>      | <b>3</b>      |

**MAHATMA GANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc ZOOLOGY PROGRAMME. COMPLEMENTARY**  
**COURSE MODEL I & MODEL II/HOME SCIENCE /BT&SP**  
**ZY3C03U. HUMAN PHYSIOLOGY AND IMMUNOLGY** (*course code & course*  
*title*) **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of 4)**

1. Protein deficiency disorder is due to  
 a) Kwarshiorker b) Beriberi c) Xerophthalmia d) Scurvy
2. Mountain sickness is  
 a) Hypoxia b) Apnoea c) Hypocapnia d) Dyspnoea
3. Urine concentration is controlled by a hormone  
 a) ADH b) ACTH c) LH d) GTH
4. Functional unit of kidney  
 a) Nephron b) Neuron c) Hepatic cells d) Nissil bodies
- .....
5. Name the muscle protein  
 a) Myosin b) Keratin c) Fibrinogen d) Chitin
6. Hyperpituterism in adults leads to  
 a) Gigantism b) Acromegaly c) Virilison d) Cushin syndrome
7. Knob like structures of nerve terminal  
 a) Synaptic nobe b) Dendrites c) Myelin d) Nodes of ranvier

8. Respiratory pigment in human blood  
 a) Haemoglobin b) Haemocyanin c) Haemerithrin d) chlorocruorin  
 .....
9. P.wave of ECG corresponds to  
 a) Auricular depolarization b) Ventricular depolarization c) Repolarization of auricle d) Repolarization of ventricle
10. Rigor mortis occurs  
 a) Before death b) After death c) During birth d) At night
11. Estrogen is  
 a) Protein hormone b) Non steroid c) Steroid d) Enzyme
12. Vaccine is an example for  
 a) Innate immunity b) Active natural c) Active artificial d) Invasive natural  
 .....
13. Primary lymphoid organ of human being  
 a) Bursa of fabricious b) Bone marrow c) Spleen d) Lymph nodes
14. A cell not involved in cell mediated immunity  
 a) T-cell b) NK cell c) Plasma cell d) Mast cell
15. The largest of immunoglobulin  
 a) IgA b) IgG c) IgD d) IgM
16. Macrophages are formed from  
 a) T lymphocytes b) B lymphocytes c) Monocyte d) Megakaryocyte  
 .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Mechanism of blood clotting
18. Distinguish between myogenic and neurogenic heart
19. Expand

- a. EEG, b. ECG
20. Comment on angiogram
  21. Comment on oxygen debt
  22. What is haemophilia
  23. Name any two neurotransmitters
  24. What is acquired immunity

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Briefly describe ultra structure of striated muscles
26. Give an account on hormones of adrenal cortex and their functions
27. What are principles of vaccination? Mention different types of vaccines
28. Briefly describe the steps involved in the production of monoclonal antibodies by Hybridoma technology
29. Briefly describe a) Haptens b) Epitope c) B-lymphocyte d) T-lymphocyte
30. What is immuno deficiency? Explain briefly the acquired immuno deficiency Syndrome

**PART D (Any 2)**

**(Essay type. Weightage 4)**

31. Give an account of urine formation
  32. Explain the mechanism of nerve impulse transmission
  33. Describe the basic structure of immunoglobulin; give the functions of Various types of immunoglobulin's
- .....

**ZY3C03U. HUMAN PHYSIOLOGY AND IMMUNOLGY**

| <b>Module</b> | <b>Part A</b> | <b>Part B</b> | <b>Part C</b> | <b>Part C</b> |
|---------------|---------------|---------------|---------------|---------------|
| 1             | 1             | .....         | .....         | .....         |
| 2             | 2             | .....         | .....         | .....         |
| 3             | 1             | 5             | .....         | .....         |
| 4             | 2             | 1             | .....         | 1             |
| 5             | 1             | 1             | .....         | 1             |
| 6             | 1             | .....         | 1             | .....         |
| 7             | 4             | .....         | 1             | .....         |
| 8             | 4             | 2             | 4             | 1             |
| <b>TOTAL</b>  | <b>16</b>     | <b>9</b>      | <b>6</b>      | <b>3</b>      |

**MAHATMA GANDHI UNIVERSITY**  
**FOURTH SEMESTER B.Sc ZOOLOGY PROGRAMME. COMPLEMENTARY**  
**COURSE MODEL I. ZY4C04U. APPLIED ZOOLOGY** (*course code & course title*)

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of 4)**

1. Mascaridine is the disease seen in  
 a) Honey bees b) Silk worm c) Earth worm d) Fishes
2. The mountage commonly used in kerala is  
 a) Natrika b) Bamboo c) Paraffin d) Tray
3. Bee pasturage is  
 a) Honey yielding plant b) Nectar yielding plant c) Honey and nectar yielding plant d) Nectar and pollen yielding plant
4. Vermitech is the technology which includes the worms  
 a) Epigeic b) Aneceic c) both epigeic and anececic d) Endogeic
- .....
5. *Bombyx mori* feeds on  
 a) Castor leaves b) Mulberry leaves c) Soma leaves d) Oak leaves
6. Removal of outer exoskeleton is the process called  
 a) Metamorphosis b) Ecdysis c) Paedogenesis d) Gametogenesis

7. Uzi fly is a pest of  
 a) Earthworms b) Honey bee c) Silk moth d) Carps
8. Stiffling is the process of killing of  
 a) Cocoons b) Honey bees c) Fishes d) worms
- .....
9. Name the edible mollusc  
 a) Dentalium b) Perna c) Teredo d) Asterias
10. Species of pearl used for pearl culture  
 a) Pinctada b) Perna c) Catla d) Dentalium
11. Mixed farming is  
 a) Fresh water farming b) Mari culture c) Monoculture d) Polyculture
12. Pearl spot is the common name of  
 a) Etroplus b) Catla c) Sardine d) Mugil
- .....
13. Causative agent of pebrine disease in silk worm  
 a) *Nosema bombysis* b) *Exorista bombysis* c) *Bacillus thrungiensis*  
 d) *Buruveris bassisna*
14. Vermicompost is  
 a) Inorganic manure b) Organic manure c) Chemical fertilizer d) Pesticide
15. Cocoons which are kept for the next generation are called  
 a) Defective cocoons b) Seed cocoons c) Double cocoons d) Dead cocoons
16. Bund or Dyke is a part of  
 a) Bee hive b) Vermipit c) Fish pond d) Bamboo trays
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What are spats?

18. Name two ornamental fishes
19. What are pearl banks
20. What are the symptoms of calcino disease
21. Name the different systems in aquaculture
22. What is gas bubble disease in fishes?
23. Mention any two controlling measures of algae
24. What is comb foundation in apiary?

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Comment on 4 species of silk moths
26. Comment on integrated farming
27. Mention the different methods used in silk worm farming
28. Comment on paddy cum prawn culture
29. Write short notes on byproducts of honey bees
30. List out different steps involved in Vermicompost preparation

**PART D (Any 2)**

**(Essay type. Weightage 4)**

31. Write an account of construction, maintenance and management of fresh water Pond culture
  32. Give an account of methods and equipments used in apiculture
  33. Explain the diseases commonly seen in silk worms
- .....

**ZY4C04U. APPLIED ZOOLOGY**

| <b>Module</b> | <b>Part A</b> | <b>Part B</b> | <b>Part C</b> | <b>Part D</b> |
|---------------|---------------|---------------|---------------|---------------|
| 1             | 5             | 6             | 2             | 1             |
| 2             | 8             | 1             | 2             | 1             |
| 3             | 2             |               | 1             |               |
| 4             | 1             | 2             | 1             | 1             |
| <b>TOTAL</b>  | <b>16</b>     | <b>9</b>      | <b>6</b>      | <b>3</b>      |

**MAHATMA GANDHI UNIVERSITY**  
**FIRST SEMESTER B.Sc ZOOLOGY COMPLEMENTARY FOR BOTANY**  
**MODEL II (PROGRAMME) EXAMINATION ... (Year)**  
**ZY1CV01U. ANIMAL DIVERSITY – NON CHORDATA (course code & course title)**  
**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of four)**

2. What is a sun animalcule?  
 a) Amoeba    b) Paramecium    c) Actinophrys    d) Plasmodium
2. Which of the following is known as venus flower basket?  
 a) Cliona    b) Euplectella    c) Sycon    d) Leucosolenia
3. Example of a digenetic parasite  
 a) Entamoeba    b) Enterobium    c) Planaria    d) schistosoma
4. The causative organism of gambian fever  
 a) Leishmania    b) Trypanosoma    c) Amoeba    d) Entamoeba
5. Name the rectal ciliate  
 a) Paramecium    b) Plasmodium    c) Opalina    d) Actinophrys
6. 'Aristotle lantern' is seen in  
 a) Antedon    b) Star fish    c) Echinus    d) Ophiothrix
7. The connecting link between annelids and arthropods is  
 a) Nereis    b) Belostoma    c) Peripatus    d) Balanus
8. The animal which causes parasitic castration is  
 a) Eupagurus    b) Sacculina    c) Crab    d) Lepisma

- .....
9. The first larvae of penaeus  
a) Zoea b) Naupilus c) Mysis d) Protozoa
10. Name the mushroom coral  
a) Favia b) Fungia c) Madrepora d) Aurelia
11. Name of the phylum to which 'Arrow worms' belong to  
a) Rotifera b) Hemichordata c) Chaetognatha d) Annelida
12. Which of the following is an arachnid ectoparasite?  
a) Spider b) Scorpion c) Daphnia d) Tick
- .....
13. The function of contractile vacuole  
a) Nutrition b) Reproduction c) Osmoregulation d) Locomotion
14. Mention the class of Echinococcus  
a) Cestoda b) Trematoda c) Turbularia d) Nematodes
15. The larva of balanoglossus  
a) Planule b) Trochophore c) Tornaria d) Veliger
16. The reproductive zooids of obelia colony  
a) Hydrotheca b) Perisarc c) Blastostyle d) manubrium
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Differentiate between polyp and medusa
18. Give an account of Gemmules in sponges
19. Write a short note on Archiannelids with examples
20. Comment on the feeding mechanism in paramecium
21. Classify phylum Annelida with examples?
22. Write a short note on Pleurobrachia

23. Write the parasitic adaptations of Fasciola
24. State the significance of Limulus

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Briefly describe on polymorphism in Coelenterates
26. Explain canal systems in sponges
27. Describe the larval stages of Penaeus
28. Write a detailed account of pearl culture
29. Explain conjugation in Paramecium
30. Briefly describe the life cycle of Plasmodium

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Write an essay on pathogenic nematodes
  32. Write an essay on water vascular system of Star fish
  33. Write an essay on life history of Fasciola
- .....

**MAHATMA GANDHI UNIVERSITY**  
**SECOND SEMESTER B.Sc ZOOLOGY COMPLEMENTARY FOR BOTANY**  
**MODEL II (PROGRAMME) EXAMINATION ... (Year)**  
**ZY2CV02U. ANIMAL DIVERSITY – CHORDATA (course code & course title)**

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of four)**

1. Name the class to which oikopleura belongs to  
 a) Ascidiacea b) Thaliacea c) Larvaceae d) Placodermi
2. Example of cyclostomata  
 a) Petromyzon b) Ascidia c) Amphioxus d) Narcine
3. Which of the following is a flying fish?  
 a) Shark b) Exocoetus c) chimera d) Latimeria
4. The animal having wheel organ  
 a) Amphioxus b) Ascidia c) Wheel animalcule d) Salpa

- .....
5. Name an aestivating fish  
 a) Lepidosiren b) Etroplus c) Sardine d) Mugil
  6. Name the order comes under Amphibia  
 a) Chiroptera b) Anura c) Chelonia d) Squamata
  7. Number of cranial nerves in rabbit  
 a) 10 pairs b) 12 pairs c) 8 pairs d) 14 pairs
  8. The first cervical vertebra in mammals

- a) Axis b) Atlas c) Lumbar vertebra d) Urostyle

- .....
9. Which of the following have placoid scales?  
a) Sardine b) Exocoetus c) Amia d) Shark
10. Example of fish having accessory respiratory organ  
a) Mullet b) Etroplus c) Catla d) Anabas
11. Name an example of parapsida  
a) Chelone b) Sphenodon c) Ichthyosaurus d) Cynognatha
12. Name a poisonous lizard  
a) Jecko b) Dryophis c) Heloderma d) Varanus
- .....
13. Zebra belongs to the order  
a) Sirenia b) Cetacea c) Carnivora d) Perissodactyla
14. The larva of amblystoma  
a) Oikopleura b) Axolotl c) Planula d) Ascidia
15. Example of Ratitae  
a) Kiwi b) Pelican c) Pigeon d) Crow
16. Name the sucker fish  
a) Ophiocephalus b) Echeneis c) Mackerel d) Channa
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Write a note on ostracoderm
18. Comment the evolutionary significance of latimeria
19. Mention any two adaptations found in Chameleon
20. Give an account of order Rhynchocephalia
21. Write two general characters of metatheria
22. Mention salient features of order Apoda
23. Write two salient characters of cetacean with an example

24. Mention atrium

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Give an account of lung fishes
26. With the help of a neat labeled diagram explain the structure of brain of rabbit
27. State the affinities of Archaeopteryx
28. Give a detailed account of retrogressive metamorphosis in ascidia
29. Write an essay on identification of poisonous and non poisonous snakes
30. Briefly explain the parental care in fishes

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Explain in detail the dentition in mammals
32. Write a detailed account of flight adaptations in birds
33. Give an account on migration in fishes
- .....

**MAHATMA GANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc ZOOLOGY PROGRAMME. COMPLEMENTARY**  
**COURSE MODEL II. ZY3CV03U. HUMAN PHYSIOLOGY AND**  
**IMMUNOLGY (course code & course title) (Same as Model I)**  
**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of 4)**

1. Protein deficiency disorder is due to  
 a) Kwashiorker b) Beriberi c) Xerophthalmia d) Scurvy
2. Mountain sickness is  
 a) Hypoxia b) Apnoea c) Hypocapnia d) Dyspnoea
3. Urine concentration is controlled by a hormone  
 a) ADH b) ACTH c) LH d) GTH
4. Functional unit of kidney  
 a) Nephron b) Neuron c) Hepatic cells d) Nissil bodies
- .....
5. Name the muscle protein  
 a) Myosin b) Keratin c) Fibrinogen d) Chitin
6. Hyperpituterism in adults leads to  
 a) Gigantism b) Acromegaly c) Virilson d) Cushin syndrome
7. Knob like structures of nerve terminal  
 a) Synaptic nobe b) Dendrites c) Myelin d) Nodes of ranvier

8. Respiratory pigment in human blood  
a) Haemoglobin b) Haemocyanin c) Haemerithrin d) chlorocruorin  
.....
9. P.wave of ECG corresponds to  
a) Auricular depolarization b) Ventricular depolarization c) Repolarization of auricle d) Repolarization of ventricle
10. Rigor mortis occurs  
a) Before death b) After death c) During birth d) At night
11. Estrogen is  
a) Protein hormone b) Non steroid c) Steroid d) Enzyme
12. Vaccine is an example for  
a) Innate immunity b) Active natural c) Active artificial d) Invasive natural  
.....
13. Primary lymphoid organ of human being  
a) Bursa of fabricious b) Bone marrow c) Spleen d) Lymph nodes
14. A cell not involved in cell mediated immunity  
a) T-cell b) NK cell c) Plasma cell d) Mast cell
15. The largest of immunoglobulin  
a) IgA b) IgG c) IgD d) IgM
16. Macrophages are formed from  
a) T lymphocytes b) B lymphocytes c) Monocyte d) Megakaryocyte  
.....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Mechanism of blood clotting
18. Distinguish between myogenic and neurogenic heart
19. Expand  
a. EEG, b. ECG

20. Comment on angiogram
21. Comment on oxygen debt
22. What is haemophilia
23. Name any two neurotransmitters
24. What is acquired immunity

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2)**

25. Briefly describe ultra structure of striated muscles
26. Give an account on hormones of adrenal cortex and their functions
27. What are principles of vaccination? Mention different types of vaccines
28. Briefly describe the steps involved in the production of monoclonal antibodies by Hybridoma technology
29. Briefly describe a) Haptens b) Epitope c) B-lymphocyte d) T-lymphocyte
30. What is immuno deficiency? Explain briefly the acquired immuno deficiency Syndrome

**PART D (Any 2)**

**(Essay type. Weightage 4)**

31. Give an account of urine formation
32. Explain the mechanism of nerve impulse transmission
33. Describe the basic structure of immunoglobulin; give the functions of Various types of immunoglobulin's

.....

**ZY3C03U. HUMAN PHYSIOLOGY AND IMMUNOLOGY**

| <b>Module</b> | <b>Part A</b> | <b>Part B</b> | <b>Part C</b> | <b>Part C</b> |
|---------------|---------------|---------------|---------------|---------------|
| 1             | 1             | .....         | .....         | .....         |
| 2             | 2             | .....         | .....         | .....         |
| 3             | 1             | 5             | .....         | .....         |
| 4             | 2             | 1             | .....         | 1             |
| 5             | 1             | 1             | .....         | 1             |
| 6             | 1             | .....         | 1             | .....         |
| 7             | 4             | .....         | 1             | .....         |
| 8             | 4             | 2             | 4             | 1             |
| <b>TOTAL</b>  | <b>16</b>     | <b>9</b>      | <b>6</b>      | <b>3</b>      |

**MAHATMA GANDHI UNIVERSITY**  
**FOURTH SEMESTER B.Sc ZOOLOGY PROGRAMME. COMPLEMENTARY**  
**COURSE MODEL II. ZY4CV04U. APPLIED ZOOLOGY** (*course code &*  
*course title*) **(Same as Model I)** **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weight 1 each for a bunch of 4)**

1. Mascaridine is the disease seen in  
 a) Honey bees b) Silk worm c) Earth worm d) Fishes
2. The moutage commonly used in kerala is  
 a) Natrika b) Bamboo c)n Paraffin d) Tray
3. Bee pasturage is  
 a) Honey yielding plant b) Nectar yielding plant c) Honey and nectar yielding plant d) Nectar and pollen yielding plant
4. Vermitech is the technology which includes the worms  
 a) Epigeic b) Aneceic c) both epigeic and anececic d) Endogeic
- .....
5. *Bombyx mori* feeds on  
 a) Castor leaves b) Mulberry leaves c) Soma leaves d) Oak leaves
6. Removal of outer exoskeleton is the process called  
 a) Metamorphosis b) Ecdysis c) Paedogenesis d) Gametogenesis
7. Uzi fly is a pest of

- a) Earthworms b) Honey bee c) Silk moth d) Carps
8. Stiffling is the process of killing of  
a) Cocoons b) Honey bees c) Fishes d) worms
- .....
9. Name the edible mollusc  
a) Dentalium b) Perna c) Teredo d) Asterias
10. Species of pearl used for pearl culture  
a) Pinctada b) Perna c) Catla d) Dentalium
11. Mixed farming is  
a) Fresh water farming b) Mari culture c) Monoculture d) Polyculture
12. Pearl spot is the common name of  
a) Etroplus b) Catla c) Sardine d) Mugil
- .....
13. Causative agent of pebrine disease in silk worm  
a) *Nosema bombysis* b) *Exorista bombysis* c) *Bacillus thrungiensis*  
d) *Buruveris bassisna*
14. Vermicompost is  
a) Inorganic manure b) Organic manure c) Chemical fertilizer d) Pesticide
15. Cocoons which are kept for the next generation are called  
a) Defective cocoons b) Seed cocoons c) Double cocoons d) Dead cocoons
16. Bund or Dyke is a part of  
a) Bee hive b) Vermipit c) Fish pond d) Bamboo trays
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What are spats?
18. Name two ornamental fishes

19. What are pearl banks
20. What are the symptoms of calcino disease
21. Name the different systems in aquaculture
22. What is gas bubble disease in fishes?
23. Mention any two controlling measures of algae
24. What is comb foundation in apiary?

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Comment on 4 species of silk moths
26. Comment on integrated farming
27. Mention the different methods used in silk worm farming
28. Comment on paddy cum prawn culture
29. Write short notes on byproducts of honey bees
30. List out different steps involved in Vermicompost preparation

**PART D (Any 2)**

**(Essay type. Weightage 4)**

31. Write an account of construction, maintenance and management of fresh water Pond culture
  32. Give an account of methods and equipments used in apiculture
  33. Explain the diseases commonly seen in silk worms
- .....

**ZY4C04U. APPLIED ZOOLOGY**

| <b>Module</b> | <b>Part A</b> | <b>Part B</b> | <b>Part C</b> | <b>Part D</b> |
|---------------|---------------|---------------|---------------|---------------|
| 1             | 5             | 6             | 2             | 1             |
| 2             | 8             | 1             | 2             | 1             |
| 3             | 2             |               | 1             |               |
| 4             | 1             | 2             | 1             | 1             |
| <b>TOTAL</b>  | <b>16</b>     | <b>9</b>      | <b>6</b>      | <b>3</b>      |

**MODEL QUESTION PAPERS  
FOR THE**

**RESTRUCTURED**

**Syllabus for B.Sc.**

***Biological Techniques and***

***Specimen Preparation***

***(BT & SP)***

**(UGC-sponsored Vocational Course)**

**MAHATMA GANDHI UNIVERSITY**  
**FIRST SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND SPECIMAN**  
**PREPARATION (PROGRAMME) EXAMINATION ... (Year)**  
**ZB1VB02U. PREPARATION OF BIOLOGICAL SPECIMENS 1: PLANTS**  
*(course code & course title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. The person considered to be the 'Father of Taxonomy'  
 (a) Theophrastus (b) Carolus Linnaeus (c) George Bentham (d) Aristotle
  2. The unit of biological classification is called  
 (a) Family (b) Genus (c) Taxon (d) Species
  3. When plants are classified on evolutionary principle, the system is known as  
 (a) Artificial system (b) Natural system (c) Phylogenetic system  
 (d) Binomial system
  4. In hypogynous flowers, all floral parts arise  
 (a) Below the gynoecium (b) Above the gynoecium  
 (c) Below the level of the leaf (d) Around the gynoecium
- .....
5. ----- is used for poisoning herbarium specimens  
 (a) Acetocarmine (b) Mercuric chloride (c) Xylene (d) DDT
  6. ----- is an ingredient in the Hessler's formula used for preserving red and yellow color of fruits.  
 (a) Sucrose (b) Acetic acid (c) Zinc chloride (d) Fast green
  7. The material used for making teaching models is  
 (a) Rubber (b) Cement (Plaster of Paris) (d) Wood

8. Glycerine jelly is used as  
(a) mounting agent (b) clearing agent (c) dehydrating agent (e) stain
- .....
9. Maize is considered to be a:  
(a) Millet (b) Cereal (c) Pulse (d) Nut
10. The following is an ingredient in the Hessler's formula  
(a) Sucrose (b) Acetic acid (c) Zinc chloride (d) Fast green
11. The source of opium is  
(a) Solanum tuberosum (b) Papaver somniferum (c) Cannabis sativa  
(d) Adhatoda vasica
12. The plant which yields oil is  
(a) Phaseolus mungo (b) Beta vulgaris (c) Arachis hopogea (d) Carica  
papaya

- .....
13. Aquatic plants are known as -----
14. The specialized roots of epiphytes are called -----
15. Palynology is the study of -----
16. Mycology is the study of -----
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is numerical taxonomy?
18. What is vasculum?
19. What is chemotaxonomy?
20. Comment on the 5-kingdom classification.
21. What are xerophytes?
22. List 2 modelling materials.
23. List the composition of any one fixing fluid.
24. What is the composition of Carnoy's fluid?

**PART C (Any 4)****(Short essay/problem solving type. Weightage 2 each)**

25. “In recent years taxonomy has become a synthetic science deriving evidences from a number of sources” . Explain.
26. What is palynology? What are its applications?
27. Comment on Bentham & Hooker’s classification.
28. Give an account of the different methods adopted for dehydration, and explain their significance.
29. Discuss the characteristics of teaching models.
30. What is the procedure for preserving berries in dry condition?

**PART D (Any 2)****(Essay type. Weightage 4 each)**

31. Describe the collection and processing of algae for teaching purpose.
  32. Give an account of the broad classification of plants with special reference to the recent ones such as molecular taxonomy.
  33. Describe the method of permanent slide preparation of free-hand sections
- .....

**MAHATMA GANDHI UNIVERSITY**  
**FIRST SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND SPECIMAN**  
**PREPARATION (PROGRAMME) EXAMINATION ... (Year)**  
**ZB1VB03U . PREPARATION OF BIOLOGICAL SPECIMENS 2: ANIMALS**  
*(course code & course title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. The type of scales covering the body of sharks is  
 (a) cycloid (b) ctenoid (c) placoid (d) cuboidal
  2. Which of the following is not a characteristic of Phylum Annelida?  
 (a) Parapodia (b) Notochord (c) Trochophore larva (d) Metamerism
  3. The animal known as 'slipper animalcule' is  
 (a) Paramecium (b) Trypanosoma (c) Euglena (d) Vorticella
  4. Which of the following animal is not an insect?  
 (a) Beetle (b) Lobster (c) Silver fish (d) Silk worm
- .....
5. Which of the following is not used in Alizarin preparation?  
 (a) Sodium chloride (b) Potassium hydroxide (c) Formalin (d) Glycerin
  6. ----- is not a vital stain  
 (a) Janus Green (b) Neutral Red (c) Methylene Blue (d) Eosin
  7. Which of the following is a chemical fixative?  
 (a) Cholesterol (b) Ascorbic acid (c) Acetic acid (d) Lipase
  8. ----- beetle is used in skeletal preparations.  
 (a) Dermal beetle (b) Rhinoceros beetle (c) Dermestid beetle (d) Dung beetle
- .....
9. ----- is not a larva of crustaceans  
 (a) Nauplius (b) Mysis (c) Trochophore (d) Zoea
  10. ----- is the intermediate host in Malarial infection  
 (a) Man (b) Mosquito (c) Pig (d) Snail
  11. The infective stage to humans in schistosomiasis is  
 (a) the adult (b) miracidum (c) Sporocyst (d) cercaria
  12. ----- is a plankton

(a) Corals (b) Sponges (c) Sagitta (d) Sacculina

- .....
13. The larval form of star fish is -----
  14. Neoteny is exhibited by ----- (Generic name of animal)
  15. Retrogressive metamorphosis is exhibited by ----- (Generic name of animal)
  16. Petromyzon is commonly called -----

.....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Comment on Pearl oyster
18. What is meant by a radially symmetrical diploblastic animal?
19. Comment on Bipinnaria larva
20. Comment on crop in birds
21. List the components of Bouin's fluid
22. What is a mordant? Give one example.
23. What are vital stains? Give one example
24. Give the names of any two narcotizing agents.

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. How do you prepare a cyanide killing bottle? What is its use?
26. How are amphibians collected to be used as museum specimens?
27. Comment on the medical importance of helminthes.
28. Describe the process of resin-embedding for zoological specimens
29. How do you make a culture of Paramecium?
30. Describe the processes involved in the temporary slide preparation of the rectal ciliates of frog.

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Discuss the various fish collection methods
  32. Write a note on plankton nets and their operation.
  33. Give an account of the different methods adopted for dehydration, and explain their significance
- .....

**MAHATMA GANDHI UNIVERSITY**  
**SECOND SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND SPECIMAN**  
**PREPARATION (PROGRAMME) EXAMINATION ... (Year)**  
**ZB2VB04U . GENERAL BIOLOGICAL TECHNIQUES. (course code & course**  
*title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. ----- is an example for ionizing radiation  
 (a) UV (b) X-rays (c) Visible light (d) Radio waves
  2. Name a sealent.  
 (a) Nail polish (b) Glycerine (c) Iodine (d) Ethyl alcohol
  3. A commonly used dehydrating agent is:  
 (a) FAA (b) Xylene (c) Alcohol (d) Formalin
  4. Carmine is obtained from:  
 (a) Plant (b) Insect (c) Coal-tar (d) Bird
- .....
5. Phycology is the study of  
 (a) algae (b) fungi (c) Bacteria (d) Protista
  6. Viruses are groups of organisms that lack ---  
 (a) Nucleus (b) Cell wall (c) Cell organelles (d) all of the above
  7. The temperature maintained in an autoclave is:  
 (a) 100°C, (b) 110°C (c) -196°C (d) -20°F
  8. Turbidimetry is used to measure  
 (a) Microbial survival (b) Microbial growth (c) Microbial death  
 (d) Microbial contamination
- .....
9. Coulter counter is used to measure  
 (a) oxygen uptake (b) carbon dioxide release (c) cell number (d) cell size
  10. ----- is a medium used in culture of protozoa

- (a) McConkey agar (b) Agar agar (c) Hank' medium (d) HAT medium
11. Subculturing is ideally done in the ----- phase.  
(a) log phase (b) lag phase (c) stationary phase (d) decline phase
  12. Cutting edge angle of the knife for paraffin sectioning is  
(a)  $17^{\circ}$ - $23^{\circ}$  (b)  $17^{\circ}$ - $19^{\circ}$  (c)  $10^{\circ}$ - $20^{\circ}$  (d) none of the above

- 
13. In Gram staining the mordant is -----
  14. ----- is a technique used to determine bacterial motility
  15. Name one algal culture medium.
  16. In autoclave sterilization the pressure used is -----
- 

### **PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Comment on resolution and magnification
18. What is the function of iris diaphragm?
19. Distinguish between histology and histochemistry.
20. What is fluorescence?
21. Comment on the purpose of biological staining.
22. Define disinfection
23. Define 'sterile condition' in microbiology
24. Define the term 'aseptic condition'.

### **PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Comment on iron-hematoxylin.
26. Comment on coal-tar dyes and their use in biology.
27. What is a microtome? How is the knife sharpened?
28. Distinguish between chromatic aberration and Spherical aberration.
29. Comment on any one viral culture technique
30. Comment on Pasteurization

### **PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Compare and contrast the structure and functioning of the light and electron microscopes.
  32. Discuss the actions of the various chemical agents commonly used in sterilization / disinfection.
  33. Describe the various methods for measuring bacterial growth in cultures.
-

**MAHATMA GANDHI UNIVERSITY**  
**SECOND SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND SPECIMAN**  
**PREPARATION (PROGRAMME) EXAMINATION ... (Year)**  
**ZB2VB05U . PREPARATION OF PERMANENT SLIDES. (course code & course**  
*title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. The cell type with the least power of regeneration is:  
 (a) bone (b) skin (c) neuron (d) liver
  2. An example for a monocot is  
 (a) Alga (b) Lichen (c) Palms (d) Pea plant
  3. Papanicolaou's staining is commonly used in  
 (a) Phycology (b) Bacteriology (c) Cytology (d) Haematology
  4. ----- is a fixative  
 (a) Zenker's fluid (b) Haematoxylin (c) Xylene (d) DPX
- .....
5. The last phase of meiotic prophase I is  
 (a) Diplotene (b) Diakinesis (c) Anaphase (d) Zygotene
  6. In Gram staining, the counterstain used is  
 (a) Crystal violet (b) Iodine (c) Safranin (d) Gentian violet
  7. In which of the following stage of mitosis chromatids move apart?  
 (a) Prophase (b) Metaphase (c) Anaphase (d) Telophase
  8. Through ----- prepared food from the leaves travels to the other parts of the plant.  
 (a) sclerenchyma (b) parenchyma (c) xylem (d) phloem
- .....
9. Multiple nuclei are seen in

- (a) squamous epithelium (b) striated muscle cell (c) non-striated muscle cell (d) cuboidal epithelium.
10. Vascular bundle refers to  
(a) apical meristem (b) axillary bud (c) xylem and phloem (d) none of the above.
11. Nosocomial infections are those that are contracted from ---  
(a) hotels (b) hostels (c) hospitals (d) houses
12. Tetrads are seen during  
(a) Leptotene (b) Zygotene (c) Pachytene (d) Diplotene
- .....
13. ----- staining is used to check the incidence of uterine cervix cancer.
14. "Hospital staph" is the name given to -----
15. Periplasmic space is found in ----- bacteria.
16. According to morphology of cells, Treponema comes under -----
- .....

### **PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Distinguish between osteoblast and osteoclast.
18. List 2 differences between dicot stem and monocot stem.
19. What is cryostat? What is its application?
20. Comment on Aspergillus and its identification.
21. Comment on peptidoglycan
22. Comment on double staining
23. Comment on coagulase test.
24. Comment on acid-fast bacteria

### **PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Comment on Papanicolaou staining.
26. Describe how you distinguish bone tissue.
27. What is synaptonemal complex?
28. Comment on E.coli and its identification.
29. List 3 special staining methods in plant histology
30. What is streak plating

### **PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Describe the stages of Meiosis using suitable diagrams.
32. How will you prepare a permanent slide of bacteria obtained through a throat swab?
33. Describe the structural features of liver tissue, highlighting distinguishing features

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**MAHATMA GANDHI UNIVERSITY**  
**SECOND SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND SPECIMAN**  
**PREPARATION (PROGRAMME) EXAMINATION ... (Year)**  
**ZB2VB06U .CLINICAL CHEMISTRY AND CLINICAL MICROBIOLOGY**  
*(course code & course title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four**

1. The normal range for fasting blood glucose is  
(a) 70 – 110 mg/dL (b) 120-160 mg/dL (c) 50 – 70 mg/dL (d) 200-250 mg/dL
  2. The normal range for total serum protein is  
(a) 10-15 g/dL (b) 6-8 g/dL (c) 1- 5 g/dL (d) 20-25 g/dL
  3. The normal range for serum creatinine is  
(a) 0.9 – 1.5 mg/dL (b) 0.9 – 1.5 g/dL (c) 5- 18 mg/dL (d) 5-18 g/dL
  4. The normal range for serum triglyceride is  
(a) 200- 300 mg/dL (b) 10- 15 mg/dL (c) 80-150 mg/dL (d) 80 -150 g/dL
- .....
5. Which of the following are pyogenic cocci?  
(a) Staphylococcus (b) Streptococcus (c) Neisseria (d) all of these
  6. The coagulase test is used to differentiate Staphylococcus aureus from  
(a) other Staphylococci (b) Streptococci (c) Micrococci (d) Enterococci
  7. An important test for identifying Neisseria is

- (a) production of oxidase (b) production of catalase (c) sugar fermentation  
(d) beta-hemolysis

8. What is the usual habitat of endospore-forming bacteria that are pathogenic?  
(a) intestine of animals (b) Dust and soil (c) water (d) food

.....

.

9. ----- is a mineralocorticoid  
(a) ACTH (b) CRH (c) Aldosterone (d) Corticosteroid
10. Glycogen storage is in  
(a) Alveoli (b) Adipose tissue (c) Liver (d) Stomach
11. The sum total of all the chemical processes in the body is known as ---  
(a) Anabolism (b) Metabolism (c) Homeostasis (d) Catabolism
12. Reverse transcriptase was discovered in  
(a) Staphylococcus (b) Streptococcus (c) Arbovirus (d) Retrovirus

.....

13. ----- is the phase of a fungal life cycle which is best adapted to growing in a host's body.
14. ----- was the virus which was used in small pox vaccination
15. BCG is the abbreviation for -----
16. ----- is a spore-forming bacterium.

.....

### **PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is 'icterus index'?
18. Comment on the functions of kidney
19. Comment on the functions of glucagon and insulin.
20. Comment on SGOT
21. What are the biochemical consequences of liver cirrhosis?
22. Comment on the role of HDL.
23. Comment on mycetoma.
24. What causes the blood and mucus discharge in dysentery?

**PART C (Any 4)****(Short essay/problem solving type. Weightage 2 each)**

25. How is serum bilirubin estimated?
26. How is serum creatinine estimated?
27. Comment on the clinical aspects of obesity.
28. Describe the conditions leading to congenital syphilis.
29. Describe the conditions leading to congenital syphilis.
30. Comment on two viral diseases transmitted by arthropods.

**PART D (Any 2)****(Essay type. Weightage 4 each)**

31. Describe the Biuret method for serum protein estimation.
32. Comment on the biochemistry of gas exchange in the alveoli
33. Describe the medical importance of Clostridium species, indicating the mode of infection and transmission .

.....  
...

**MAHATMA GANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND SPECIMAN**  
**PREPARATION (PROGRAMME) EXAMINATION ... (Year)**  
**ZB3VB07U. PHYSIOLOGY WITH CLINICAL CORRELATION-1** (*course code*  
*& course title*). **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four**

1. The innermost lining of the GI tract is  
 (a) serosa (b) muscularis (c) submucosa (d) mucosa
  2. Elastase is produced from  
 (a) salivary glands (b) Small intestine (c) pancreas (d) liver
  3. Beriberi is due to the deficiency of  
 (a) Vitamin B1 (b) Vitamin B2 (c) Vitamin B6 (d) Vitamin C
  4. The building blocks of proteins are:  
 (a) Monosaccharides (b) Nitrogenous bases (c) aminoacids (d) purines
- .....
5. The plasma constitutes ----% of blood.  
 (a) 55% (b) 45% (c) 30% (d) none of the above
  6. ----- is a granulocyte  
 (a) lymphocyte (b) basophil (c) monocyte (d) platelet
  7. Breathing centre is located in  
 (a) alveoli (b) medulla oblongata (c) bronchii (d) pharynx
  8. Rennin is  
 (a) a hormone (b) an enzyme (c) an aminoacid (d) a metabolic poison
- .....
9. ----- is an enzyme in saliva  
 (a) Amylase (b) Renin (c) Lipase (d) Rennin
  10. Deficiency of vitamin ---- leads to scurvey

- (a) A (b) B1 (c) C (d) D
11. Cretinism results from deficiency of  
(a) Growth hormone (b) Testosterone (c) Oestrogens (d) Thyroxine
12. Prolactin is secreted from –  
(a) Hypothalamus (b) Anterior pituitary (c) Ovary (d) Posterior pituitary

- .....
13. ----- cells secrete HCl.
14. Pancreatic polypeptide is secreted by -----
15. ----- transports T4 in blood
16. Respiratory centre is located in -----
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is marasmus?
18. What is anorexia nervosa?
19. What is peristalsis?
20. What is Respiratory Quotient?
21. What is emphysema?
22. What is cretinism?.
23. What is embolism?
24. What is angina pectoris?

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Comment on positive feedback.
- 26 Comment on the digestive processes in the stomach.
27. Comment on Grave's disease.
28. Comment on ECG and its uses.
29. Discuss the control of ventilation in man
30. Comment on SAD.

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

- 31 Describe the various activities (route, digestion, absorption) in the GI tract when a piece of meat is ingested.
32. Describe the hypothalamic hormones and their roles..

33. Discuss the Blood clotting mechanism.

.....

**MAHATMA GANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND SPECIMAN**  
**PREPARATION (PROGRAMME) EXAMINATION ... (Year)**  
**ZB3VB08U . PHYSIOLOGY WITH CLINICAL CORRELATION-2 (course**  
*code & course title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**  
**Part A (Objective type. Weightage 1 each for a bunch of four**

1. Which of the following is not a mixed nerve?  
 (a) Trigeminal (b) Hypoglossal (c) Facial (d) Glossopharyngeal
  2. Which of the following is not a neuroglia?  
 (a) Astrocyte (b) Microglia (c) Oligodendrocyte (d) Unipolar
  3. The receptor for pain is  
 (a) free nerve ending (b) Pacinian corpuscle (c) Meissner;s corpuscle  
 (d) Merkel's disc
  4. Convex lenses are used to correct  
 (a) Short-sight (b) Long-sight (c) Astigmatism (d) Cataract
- .....
5. An important buffer in interstitial fluid is  
 (a) Hemoglobin (b) Other proteins (c) Carbonic acid (d) Phosphoric acid
  6. Aldosterone exerts its greatest effect on  
 (a) Glomerulus (b) Proximal tubule (c) Thick portion of the loop of Henle  
 (d) Thin portion of the loop of Henle
  7. Multinucleate condition is characteristic of  
 (a) skin epithelium (b) non-striated muscle cell (c) striated muscle cell  
 (d) nephron
  8. The cross bridges of the sarcomere in skeletal muscle are made of

(a) Actin (b) Myosin (c) Troponin (d) Tropomyosin

- .....
9. Corpus callosum is in –  
 (a) Kidney (b) Heart (c) Brain (d) Liver
10. ----- is the receptor for pressure  
 (a) Pacinian corpuscle (b) Cochlea (c) Free nerve endings (d) Sacculle
11. ----- lenses are used to correct myopia  
 (a) convex (b) concave (c) crenulated (d) none of the above
12. The tuft of capillaries associated with nephron is called –  
 (a) Henlee's loop (b) Bowmann's capsule (c) Glomerulus (d) microglia

- .....
13. The visual pigment in the rods is -----
14. Bone resorptive cells are the -----
15. ----- is a hormone which is also a neurotransmitter.
16. Cartilage-forming cells are the -----
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is Amnesia?
18. What are proprioceptors?
19. What is sarcomere?
20. What is nephritis?
21. Comment on EMG.
22. Comment on the role of aldosterone on nephrons.
23. Comment on slow and fast muscle fibres
24. Comment on Alzheimer's disease

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Describe the limbic system.
26. Discuss the functions of the cerebellum.
27. Write a note on the association areas of the brain.
28. Explain the events happening in the glomerular – Bowmann's capsule region.
29. Discuss the structural and functional aspects of cardiac muscle.
30. Distinguish between hemodialysis and peritoneal dialysis

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. With the help of a neat, labeled diagram, describe the working of the ear pertaining to the hearing function.
32. Describe physiological basis of learning and memory.

33. Describe with the help of suitable labeled diagrams, the physiology of muscle contraction emphasizing the molecular details.
- .....

**MAHATMA GANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND SPECIMAN**  
**PREPARATION (PROGRAMME) EXAMINATION ... (Year)**  
**ZB3VB09U. GENERAL LABORATORY TECHNIQUES AND ELECTRONICS**  
*(course code & course title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four**

1. The Molarity of pure water is  
 (a) 45.6.M (b) 55.6 M (c) 55.0 M (d) 54.6 M
  2. Sterilization of glassware can be done by  
 (a) Dry heating at 150°C for 1 h (b) Rinsing in 0.1 % aqueous HgCl<sub>2</sub>  
 (b) Boiling in water for 15 min. (d) All of the above
  3. Elements of electric heater is made of  
 (a) Aluminium (b) Carbon (c) Nichrome (d) Copper
  4. Pipettes are soaked in ----- for cleaning  
 (a) Detergent (b) Lysol (c) Chromic acid (d) Ethyl alcohol
- .....
5. Which of the following components obeys Ohm's law?  
 (a) Diode (b) Transistor (c) Resistor (d) Capacitor
  6. Syringes with infectious material should be washed in ---before being cleaned.  
 (a) 2% Lysol (b) 2% formalin (c)10% HCl (d) 10% formalin
  7. 0.85% NaCl is made by dissolving 0.85 g NaCl in ----- ml of distilled water.  
 (a) 100 ml (b) 85 ml (c) 75 ml (d) 1000 ml
  8. Molecular mass of Sulphuric acid is  
 (a) 98 (b) 63 (c) 36 (d) 58
- .....
9. Solvent system used in ascending paper chromatography is  
 (a) Butanol:acetic acid:water (b) Butanol: sulphuric acid:water  
 (b)Butanol: acetic acid: methanol (d) none of the above
  10. Which of the following is not a sterilization method?  
 (a) boiling (b) dry heat (c) autoclave (d) washing in distilled water
  11. Which of the following is an active component?  
 (a) Resistor (b) Capacitor (c) Indicator (d) Transistor
  12. Which of the following offers high resistance to high frequency current?

(a) Inductor (b) Resistor (c) Capacitor (d) Diode

- .....
13. Negatively charged ions go to ----- (electrode)
  14. Ion exchangers are used for -----
  15. ppm is the abbreviation for -----
  16. The negative logarithm of hydrogen ion concentration is known as ----
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is an anion?
18. What is meant by a glass still?
19. What is buffer?
20. What is meant by weight by volume?
21. What is a circuit diagram?
22. What is filter sterilization?
23. Define Normality
24. Comment on Phosphate buffer

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Comment on types of distillation stills.
26. Comment on regeneration of ion-exchangers.
27. Comment pH determining devices.
28. Comment on pipette cleaners
29. Comment on transistors.
30. Comment on Capacitors

**PART D (Any 2)**

**(Essay type. Weightage 4 )**

31. Describe the working of a pH meter.
  32. Describe the various types of ion exchangers.
  33. Draw the circuit diagram of a voltage stabilizer and explain its working
- .....

**MAHATMA GANDHI UNIVERSITY**  
**ZB4VB10U. FOURTH SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND**  
**SPECIMEN PREPARATION (PROGRAMME) EXAMINATION ... (Year)**  
**TEACHING LABORATORY TECHNIQUES AND WATER, SOIL AND AIR**  
**TECHNIQUES. (course code & course title).**

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four**

1. Which of the following is a fungal disease in fishes?  
 (a) Dropsy (b) Anchorworm disease (c) Velvet disease (d) Cottonwool disease
  2. ----- is used to treat fish infected with white spot disease.  
 (a) Tetracycline (b) Neomycin (c) Malachite green (d) MS222
  3. ----- is not an equipment found in a teaching laboratory  
 (a) Light microscope (b) LCD projector (c) Cryostat (d) overhead projector
  4. A confined place where garden lizards are kept ..  
 (a) Herbarium (b) Aquarium (c) Terrarium (d) animal house
- .....
5. Earth Day is celebrated on  
 14 November (b) 22 April (c) 7 April (d) 4 October
  6. World Environment Day is celebrated on  
 5 June (b) 22 April (c) 7 April (d) 1 December
  7. Aerosols are released by  
 Industries (b) Aeroplanes (c) Automobiles (d) Fertilizers
  8. Cholera spreads due to  
 food adulteration (b) water pollution (c) Humid weather (d) Chemical pollution.
- .....
9. A space where terrestrial organisms are kept for study is  
 (a) Aquarium (b) Museum (c) Terrarium (d) None of the above
  10. Dactylogyrus is  
 (a) aquarium fish (b) Fungus (c) Monogenean (d) Mollusc

11. The causative agent of velvet disease is  
(a) fungus (b) bacterium (c) virus (d) parasite
12. ----- is not an equipment in a teaching laboratory  
(a) Microscope (b) OHP (c) Scintillation counter (d) Cupboard

- 
13. CFC is the abbreviation for -----
  14. PCB is the abbreviation for -----
  15. BOD is the abbreviation for -----
  16. COD is the abbreviation for -----
- 

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is meant by a teaching laboratory?
18. What is meant by stock register?
19. Define breeding tank.
20. What is Environmental Education?
21. What is black sand mining?
22. Comment on aerators.
23. Comment on types animal housing..
24. Comment on purchase orders.

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Comment on velvet disease.
26. Comment on Gyrodactylus.
27. Comment on frequency dominance.
28. How is stock register of a laboratory maintained?
29. Comment on the safety measures adopted in an animal house.
30. Comment on the impact of stress on captive animals

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Given a water sample, how will you analyze it for biotic pollutants?
  32. How will you set up a terrarium?
  33. Given a soil sample, how will you analyze it for nitrates and phosphate  
content?
-

**MAHATMA GANDHI UNIVERSITY**  
**FOURTH SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND SPECIMAN**  
**PREPARATION (PROGRAMME) EXAMINATION ... (Year).**  
**ZB4VB11U .TISSUE CULTURE AND GENE MANIPULATION (course code &**  
*course title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 6** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four**

1. The earliest experiments on growing animal cells in culture were done by:  
 (a) Carrel (b) Harison (c) Pasteur (d) Kabat
  2. Subculturing is done at  
 (a) lag phase (b) log phase (c) stationary phase (d) decline phase
  3. Hanging drop technique was first used by  
 (a) Carrel (b) Harison (c) Pasteur (d) Kabat
  4. Hybridoma Technology was introduced by  
 (a) Beadle and Tatum (b) Lederberg and Lederberg (c) Messelson and Stahl (d) Milstein and Kohler
- .....
5. GAATTC is the recognition site of  
 (a) EcoR1 (b) Hind III (c) Bam H (d) none of the above
  6. The back bone of DNA is by  
 (a) H bonds (b) Phosphodiester bonds (c) Van-der Waals forces  
 (d) Peptide bonds
  7. DNA polymerases catalyse polymerization in the ---- direction  
 (a) 3'-5' (b) 5'-3' (c) both 5'-3' and 3'-5' (d) none of the above
  8. EcoR1 is  
 (a) a protease (b) a vitamin (c) a hormone (d) a restriction endonuclease
- .....
9. Cell fusion is accomplished by adding  
 (a) Formalin (b) PEG (c) EDTA (d) HAT medium

Board of Studies in Zoology (UG) Mahatma Gandhi University,  
 Kottayam

10. Hybridomas are selected using  
(a) Formalin (b) PEG (c) HAT medium (d) none of the above
11. Choose the odd one out.  
(a) Plasmid (b) Phage (c) YAC (d) PAGE
12. Example for a continuous cell line is  
(a) Eco R1 (b) Bam H (c) Taq (d) He La

- 
13. The scientist who cloned Dolly is -----
  14. YAK is the abbreviation for -----
  15. ----- invented the prototype of the present day tissue culture flask.
  16. cDNA is the abbreviation for -----
- 

### **PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is meant by primary culture?
18. What is meant by meristem culture?
19. What is meant by hybridoma?
20. What is germplasm?
21. Define explant.
22. What is a vector?
23. Give the structure of a nucleotide.
24. What is a plasmid?

### **PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. comment on HeLa cells
26. Comment on tissue disaggregation.
27. Comment on any 2 restriction enzymes.
28. Comment on cDNA.
29. Comment on phage DNA library
30. Comment on genomics

### **PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Describe the procedure for hybridoma technology
  32. Discuss the common features of continuous cell lines.
  33. Discuss the various gene transfer techniques.
-

**MAHATMA GANDHI UNIVERSITY**  
**FIFTH SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND SPECIMAN**  
**PREPARATION (PROGRAMME) EXAMINATION ... (Year)**  
**ZB5VB12U . PRODUCTION AND MARKETING OF BIOLOGICAL SPECIMENS**  
*(course code & course title).*

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four**

1. Factor not affecting quality  
 (a) market research (b) money (c) product design (d) product size
  2. Balance sheet is  
 (a) a statement of liabilities (b) a form of account (c) summary of assets  
 (d) statement of accounts
  3. Which of the following is not a fixed capital?  
 (a) land (b) employee's wages (c) tools (d) furniture
  4. Process layout is employed by  
 (a) batch production (b) continuous type of production  
 © none of the above (d) all of the above
- .....
5. Which of the following taxes is the most elastic?  
 (a) Income tax (b) Sales tax (c) Excise duty (d) Customs duty
  6. Which of the following is not an esteem need?  
 (a) Status (b) Safety (c) Recognition (d) Respect
  7. Statistical quality control techniques are based on the theory of  
 (a) Quality (b) Statistics (c) Probability (d) All of the above
  8. Inventory includes:  
 (a) raw materials (b) Semi-finished goods (c) finished goods  
 (d) all of the above
- .....
9. The Stock Turnover ratio may be calculated as:  
 (a) Cost of goods sold/Average stock (b) Turnover at cost /Stock at cost

© Turnover at selling Price / Stock at Selling Price

10. Variable cost per unit
  - (a) Remains fixed (b) Fluctuates with the volume of production. (c) Varies in sympathy with the Volume of Sales (d) Never changes
11. Period cost means:
  - (a) Variable cost (b) Fixed cost (c) Prime cost (d) None of these
12. A stipulation essential to the main purpose of the contract is known as:
  - (a) Condition (b) Warranty (c) Mere expression of opinion (d) None of the above

- 
13. Product layout means -----
  14. An example for fixed capital is ----
  15. Trade name means -----
  16. An example for fixed asset -----
- 

### **PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is meant by product layout
18. What is meant by work cost?
19. What is 'journal'?
20. Define working capital.
21. What is Social Marketing?
22. What is meant by Quotations?
23. What is Trade name?
24. What is meant by Motivation?

### **PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Comment on storage on biological goods.
26. What is Quality control?
27. Comment on Balance sheet
28. Comment on funds flow statement.
29. Comment on sources of short-term finance
30. Comment on fixed assets turn over ratio.

### **PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Discuss the process of storage and packing of finished biological products.
  32. Discuss the various quality control methods.
  33. What is Green marketing? What is its relevance?
-

**MAHATMA GANDHI UNIVERSITY**  
**FIFTH SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND SPECIMAN**  
**PREPARATION (PROGRAMME) EXAMINATION ... (Year)**  
**ZB5VB12U Core-15 . RADIOLOGICAL, BIOCHEMICAL AND ADVANCED**  
**INSTRUMENTATION TECHNIQUES (course code & course title).**

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four**

1. Radioactivity was discovered by:  
 (a) Tiselius (b) Roentgen (c) Becquerel (d) Watson
  2. The properties of an element changes if the ---- is changed.  
 (a) Atomic number (b) Atomic mass (c) Mass number (d) None of the above.
  3. Ampholytes provide  
 (a) Energy (b) Mechanical support (c) pH gradient (d) Density gradient
  4. Protein A is used in affinity chromatography columns to trap  
 (a) Ig G (b) Ig M (c) monosaccharides (d) lipids
- .....
5. DNA sequencing is carried out by  
 (a) Sanger's method (b) AGE (c) Western blotting (d) Southern blotting
  6. PCR was introduced by  
 (a) Sanger (b) Mullis (c) Gilbert (d) Crick
  7. DNA bands on gels are detected using  
 (a) EDTA (b) EcoR1 (c) Ethidium bromide (d) ELISA
  8. Identity of people can be established using  
 (a) Western blotting (b) DNA footprinting (c) DNA fingerprinting (d)  
 None of the above
- .....
9. ----- is antimatter.

- (a) alpha particle (b) negatron (c) positron (d) x –rays
10. P-32 is a ----- emitter  
(a) alpha (b) weak beta (c) positron (d) strong beta
11. If the amount of radioactive carbon in a fossil is  $1/4^{\text{th}}$ , then ----- half lives have elapsed  
(a) one (b) two (c) three (d) four
12. The shielding used for tritium is  
(a) none (b) lead bricks (c) plexi glass (d) lead apron

- .....
13. PPO is the abbreviation for -----
14. POPO is the abbreviation for -----
15. The gas used in Geiger Mueller counter is -----
16. The special nucleotides used in Sanger's procedure are called -----
- .....

### **PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Define Becquerel (unit)
18. Define Positron
19. What is meant by bremsstrahlung?
20. What are fluors?
21. Define half life in radiology.
22. What is meant by Taq polymerase?
23. What is blotting?
24. What are Molecular weight standards?

### **PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Comment on VNTRs.
26. What is meant by Annealing?
27. Comment on RFLP.
28. What are minisatellites?
29. Comment on radioisotopes.
30. Comment on K-capture.

### **PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Describe the working of the Geiger- Mueller counter with the help of a suitably labeled diagram..
32. Describe how you perform TLC.
33. Describe the methodology of DNA sequencing



**MAHATMA GANDHI UNIVERSITY**  
**FIFTH SEMESTER B.Sc BIOLOGICAL TECHNIQUES AND SPECIMAN**  
**PREPARATION (PROGRAMME) EXAMINATION ... (Year)**  
**ZB5VB16U . ENTREPRENEURSHIP DEVELOPMENT AND MARKETING**  
*(course code & course title).*

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four**

1. Expansion of PERT  
 (a) Programme Evaluation Review Technique (b) Product, Evaluation Review Technique (c) Programm Evaluation Revisal Technique (d) Programme Evaluation Review Technology
  2. The four Ps of marketing  
 (a) Product, Price, Place, Pateience (b) Price, Product, Promotion, Place (c) Promotion, Place, Purchase, Price (d) Price, Product, Position, Promotion
  2. The meaning of social responsibility in business  
 (a) Responsibility of business towards others (b) Responsibility of business towards shareholders (c) Responsibility of business towards society and environment (d) None of the above
  4. Increase of share premium results in :  
 (a) Source of fund (b) Application of fund (c) Flow of fund (d) None of the above
- .....
5. . In which of the following layouts, the lines need to be balanced?  
 (a) Process layout (b) Plants layout (c) Product layout (d) Fixed position layout
  6. In an auction sale the property shall be sold to the  
 (a) lowest bidder (b) All bidders (c) Highest bidder (d) None of the above
  7. Which element of the following is not an element of marketing mix?  
 (a) IRBI (b) SIDBI (c) IFCI (d) ICICI
  8. Market surveying technique means:  
 (a) Census (b) Get together (c) Publicity (d) Advertisement

- .....
9. Which of the following taxes is the most elastic?  
(a) Income tax (b) Sales tax (c) Excise duty (d) Customs duty
  10. Single Window Scheme to enable modernization /technology upgradaton was introduced by:  
(a) IRBI (b) SIDBI (c) IFCI (d) ICICI
  11. Depreciation means:  
(a) Physical deterioration of a fixed asset. (b) Allocation of the cost of fixed asset or its useful life © Decline in the market value of asset  
(d) none of the above
  12. Income tax  
(a) is an indirect tax (b) is a direct tax (c) is both direct and indirect tax  
(d) neither direct nor indirect tax
- .....
13. STED stands for -----
  14. SWOT is the abbreviation for -----
  15. ECQ stands for -----
  16. First record of a transaction is made in -----
- .....

### **PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Define Financial institutions
18. Define STED
19. What is meant by quality control?
20. What is meant by sickness in small scale industries?
21. What is meant by break-even analysis?
22. What is Trial Balance?
23. What is Social Marketing?.
24. What is Market segmentation?

### **PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Comment on Internal Rate of Return
26. Comment on De-licensing
27. Comment on Sources of Finance.
28. Comment on Financial analysis.
29. What is Joint Stock company?
30. Comment on Balance sheet

**PART D (Any 2)****(Essay type. Weightage 4 each)**

31. Discuss the concept of resource management.
  32. Discuss financing procedures and financial incentives.
  33. Discuss the applicable rules of Income Tax and Sales Tax when embarking on starting a small scale industry.
- .....

**MAHATMA GANDHI UNIVERSITY**  
**FIRST SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME) EXAMINATION**  
**... (Year) ZA1V01U. Aqua culture course-1. PRINCIPLES AND METHODS IN**  
**AQUACULTURE** *course code & course title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. .... is a fish poison of plant origin.  
 a. Rotenone    b. Aldrin    c. Phosphamidon    d. Endrin
  2. A platform like space between the wet slope and water area of a pond is known as .....  
 a. Crown    b. Core trench    c. Berm    d. Bund
  3. .... is the largest river system in India.  
 a. Ganga    b. Brahmaputra    c. Indus    d. Mahanadi
  4. .... is the most widely cultivated crab in India.  
 a. *Scylla serrata*    b. *Portunus pelagicus*    c. *Charybdis cruciata*  
 d. *Portunus sanguinolentus*
- .....
5. Among the following ..... is not a Fisheries Research Institute  
 a. CMFRI    b. CICFRI    c. CIFA    d. IVRI
  6. Among the following combinations ..... is not feasible for polyculture  
 a. *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala*  
 b. *Cyprinus carpio*, *Ctenopharyngodon idella*, and *Hypophthalmichthys molitrix*  
 c. *Hypophthalmichthys molitrix*, *Tilapia mossambica* and *Mugil cephalus*  
 d. *Labeo rohita*, *Channa marulius* and *Mugil cephalus*
  7. The antero-lateral border of the carapace is cut into 9 teeth of equal size in  
 a. *Scylla serrata*    c. *Portunus pelagicus*    c. *Portunus sanguinolentus*  
 d. *Charybdis cruciata*
  8. Among the following ..... is used for brackish water aquaculture  
 a. *Channa marulius*    b. *Labeo calbasu*    c. *Anguilla bicolor*  
 d. *Mugil cephalus*
- .....

9. Which among the following water quality parameters are estimated using Winkler's method  
 a. Dissolved oxygen      b. Salinity      c. Nitrite Nitrogen      d. Ammonia
10. Brackish water has a salinity varying from  
 a. 0-25 ppt      b. 25-35 ppt      c. 0-35 ppt      d. 35-45 ppt
11. Which among the following is not an organic fertilizer  
 a. Cow dung      b. Chicken Manure      c. Mahua oil cake      d. Slaked Lime
12. *Chaetoceros calcitrans* and *Isochrysis galbana* are examples of  
 a. Phytoplankton      b. Nekton      c. Toxic algae      d. Zooplankton
- 
13. Which among the following groups of fishes does not belong to the Family Cyprinidae  
 a. Carps      b. Mahseers      c. trouts      d. Goldfish
14. Name the reservoir constructed above the river Cauvery  
 a. Stanley Reservoir      b. Bhavanisagar Reservoir      c. Govindsagar Reservoir  
 d. Tungabhadra Reservoir
15. *Lemna* and *Pistia* are examples of  
 a. Floating weeds      b. Emergent weeds      c. Marginal weeds      d. Submerged weeds
16. *Panulirus polyphagus* is a  
 a. prawn      b. crab      c. Lobster      d. Oyster
- 

### **PART B (Any 5)**

#### **(Short answer question. Weightage 1 each)**

17. Write a note on Weed fishes and their role in aquaculture?
18. What are Hapas? What are they used for?
19. Write a short note on the important freshwater lakes in India
20. What is the significance of aquaculture compared to other agricultural practices and commercial Fisheries.
21. What are cold water fishes? Write short notes on the important indigenous and exotic species of coldwater fishes.
22. Distinguish between clams, mussels and oysters.
23. Distinguish between  
 a. Embankment ponds and Excavated ponds.  
 b. Shellfish culture and Finfish culture.  
 c. Stenohaline and Euryhaline Fishes.
24. What are Indian Major carps and exotic carps? What are the ecological zones occupied by them in polyculture?

### **PART C (Any 4)**

#### **(Short essay/problem solving type. Weightage 2 each)**

25. Calculate the amount of earth required for construction of a bund around an aquaculture pond. Specifications of the pond and bund are given below.  
 Length of the pond = 50 m  
 Breadth of the pond = 20m  
 Height of the bund = 1m  
 Width of crown = 1m  
 Dry Side slope = 1:1

Wet side slope = 1:1.5

26. Explain the concept of integrated farming? Illustrate with different examples.
27. What are sluice gates? Elaborate on the different types of sluices.
28. Describe the external morphology of a typical penaeid prawn. How can you distinguish between penaeid and non-penaeid prawns?
29. What is harvesting? Explain the different harvesting methods.
30. Write a short essay on the important soil quality parameters in aquaculture.

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Explain with suitable diagrams, the structure of a bund? Elaborate the different steps involved in bund construction?
  32. Explain the different steps involved in pond preparation?
  33. Explain the various measures that can be adopted for the development of fisheries of Indian reservoirs.
-

**MAHATMA GANDHI UNIVERSITY**

**FIRST SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME)**

**EXAMINATION ... (Year) ZA1V02U. vocational subject: Aqua culture course-2.**

**HATCHERY AND CULTURE TECHNIQUES (course code & course title).**

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. *Carassius auratus* is the scientific name of .....  
a. Angel fish   b. Gouramy   c. Gold fish   d. Guppy
2. Porous stone present in the aquarium tank act as .....  
a. Aerator   b. Diffuser   c. Activator   d. Thermostat
3. .... is known as brine shrimp  
a. Indian white prawn   b. *Moina*   c. *Artemia*   d. *Daphnia*
4. Lumut is usually used in the culture of .....  
a. milk fish   b. mullet   c. carp   d. crab
- .....
5. Mud crab is the common name of .....  
a. *Scylla serrata*   b. *Daphnia*   c. Cladoceran   d. *Portunus* sps.
6. .... is an example of a live bearer.  
a. Angel fish   b. Carp   c. Gold fish   d. Guppy
7. Monosex culture is practiced in the culture of .....  
a. Catla   b. Silver carp   c. Tilapia   d. Mullet
8. Common name of *Clarius batrachus*.  
a. Magur   b. Singhi   c. Koi   d. Ghol.
- .....

9. Murrels are coming under the group of ..... fishes  
a. shell fish. air breathing      c. Marine      d. Larvivorous
10. Scientific name of spiny lobster is.....  
a. *Panulirus sps* b. *Thenus sps*      c. *Linuparus sps*      d. *Puerulus sps*
11. Spats are young .....  
a. oysters      b. cephalopods      c. gastropods      d. lobsters
12. In ..... stage, crabs are transferred to nurseries.  
a. Zoeab. Megalopa      c. Benthic larval crab      d. Nauplius

13. Grey mullet is .....  
a. *Mugil tada*      b. *Mugil cephalus*      c. *Mugil parsia*  
d. *Rhinomugil corsula*
14. Community culture system of Prawn hatchery is otherwise known as ..... system  
a. Japanese      b. Galveston      c. Taiwanese      d. Modular
15. .... & ..... are cladocerans  
a. Moina & Artemia      b. Moina and Daphnia  
c. Micro algae & Planktons      d. Artemia & Daphnia
16. Scientific name of Giant river Prawn is .....  
a. *Macrobrachium idella*      b. *Macrobrachium malcomsonii*  
c. *Macrobrachium rosenbergi*      d. *Parapenaeopsis stylifera*

### **PART B (Any 5)**

#### **(Short answer question. Weightage 1 each)**

17. Distinguish between cage culture and raft culture.
18. What is lab- lab ? Mention its significance.
19. Describe “fattening” in culture of crabs?
20. Discuss the breeding technique of Angel fish ?
21. Intensive culture practices without proper management are not advisable in the long term. Substantiate.
22. Write a note on the different larval stages of edible oyster.
23. Comment on the prospects of frog culture
24. What is Mullet culture?

### **PART C (Any 4)**

#### **(Short essay/problem solving type. Weightage 2 each)**

25. Elaborate on the cold water fishery resources of india.
26. Briefly explain the culture of *Macrobrachium sps*.
27. What are the species of Holothurians available for aquaculture in India & Write a short note on their culture.
28. Briefly explain the milk fish culture.

29. Elaborate different techniques of Induced spawning in Pearl oyster.
30. Describe the life cycle of eel & write a note on culture of eel.

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. What is prawn filtration practice? Describe different prawn filtration practices followed in India.
  32. Write an essay on the culture of Indian Major Carps.
  33. Describe the different steps involving in isolation & culture of microalgae.
- .....

**MAHATMA GANDHI UNIVERSITY**

**SECOND SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME) EXAMINATION**

... (Year) **ZA2V03U. vocational subject- Aqua culture course-3: CAPTURE FISHERY**  
(course code & course title). **Total weightage: 25**

**Instructions:**

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. Bombay duck belongs to the family .....  
a. Stromaetidae                      b. Harpodontidae                      c. Cyprinidae                      d. Siluridae
2. Fisheries of lakes is called ..... fisheries  
a. Estuarine                      b. Riverine                      c. Lacustrine                      d. Marine
3. .... is a static gear  
a. Trawl net                      b. Purse seine                      c. gill net                      d. Troll line
4. .... is a pelagic fish  
a. *Cyanoglossus spp*                      b. *sphyrna blochii*                      c. *Epinephelus spp*  
d. *Rastrelliger sp.*

---

5. Scientific name of white pomfret is .....  
a. *Pampus chinensis*                      b. *Pampus argenteus*                      c. *Parastromateus niger*  
d. *Psettodes erumei*
6. Common name of "*Nemipterus japonicus*" is .....  
a. Thread fin                      b. Thread fin bream                      c. Ghold. Koth
7. Short bodied mackerel is .....  
a. *Rastrelliger brachysoma*                      b. *Rastrelliger kanagurta*  
c. *Rastrelliger faughni*                      d. *Pseudosciaena diacanthus*
8. Anchovy fisheries of the country does not constitute ..... species.  
a. *Stolephorus*                      b. *Thryssa*                      c. *Setipinna*                      d. *Chirocentrus*.

---

9. .... spp is not included in the group of lesser sardines.  
a. *Sardinella gibbosa*                      b. *Sardinella longiceps*



27. Describe the fisheries of Major carps & Cat fishes in inland capture fishery.
28. Comment on the problems of brackish water fisheries.
29. What is overfishing? What are the different types of overfishing? Explain the different control measures that can be employed to prevent overexploitation of fishery resources.
30. Explain the major Molluscan resources of India.

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Write an essay on Marine Fishery resources of continental shelf .
  32. Mention the important types of craft & gears used in capture fisheries of India.
  33. Write an essay on Oil Sardine fishery.
-



10. Among the following ..... is not a teeth bearing structure in fishes  
 a. Maxillary b. Vomer c. Palatines d. Epibranchial
11. In Freshwater fishes, blood and body fluids are ..... to the surrounding medium  
 a. Hyperosmotic b. Hypoosmotic c. Isoosmotic d. Non-Permeable
12. In length – frequency analysis, age can be determined by  
 a. Progression of modes or size groups  
 b. Comparison of size classes  
 c. Comparison of growth rates  
 d. Comparing growth rates of juveniles and adults
- 
13. Fin Formula for the dorsal fin of a fish having 13 spines and 12 soft rays can be represented as  
 a. D 13, 12 b. D 13, XII c. D XIII, XII d. D XIII, 12.
14. Among the following ..... Is not a live bearer  
 a. *Carassius auratus* b. *Lebistes reticulatus* c. *Gambusia affinis*  
 d. *Poecilia sphenops*.
15. The eggs of ..... are deposited in the mantle cavity of Freshwater mussel.  
 a. *Rhodeus spp* b. *Cyprinus spp.* c. *Tilapia spp.* d. *Channa spp.*
16. Aquatic animals which maintain an osmotic concentration similar to that of the surrounding medium are known  
 a. osmoconformers b. Osmoregulators c. Euryhaline d. Oligohaline.
- 

### **PART B (Any 5)**

#### **(Short answer question. Weightage 1 each)**

17. Write a note on the preservation of fishes for taxonomic studies.
18. What are median and paired fins? What are the different types of caudal fin in fishes?
19. Distinguish between holobranchs and Hemibranchs? Comment on their arrangement in teleosts and Elasmobranchs.
20. With the help of suitable diagrams, explain the structure of Ampullae of Lorenzini.
21. What are the different types of aggregations in fishes? Write short notes on each.
22. Comment on the major feeding types in fishes
23. What is cube law? Distinguish between Isometric and allometric growth in fishes.
24. Differentiate between ctenoid, cycloid and placoid scales. Give suitable diagrams and cite examples for each.

**PART C (Any 4)****(Short essay/problem solving type. Weightage 2 each)**

25. With the help of suitable diagrams, describe the different types of accessory respiratory organs in fishes.
26. Distinguish between catadromous and anadromous migration citing examples. Write a note on the factors influencing fish migration.
27. What are lateral line sense organs? Describe its structural features with suitable diagrams.
28. Explain the structure of a swim bladder in fishes with suitable diagrams. Differentiate between Physostomous and Physoclistous swim bladders.
29. Describe swimming activity in fishes. Write short notes on the different types of fish locomotion.
30. What are the different morphometric and meristic data required for fish taxonomy.

**PART D (Any 2)****(Essay type. Weightage 4 each)**

31. Comment on the significance of parental care in fishes. Explain the different types of parental care exhibited by fishes, with examples.
  32. Define osmoregulation? Describe the different osmoregulatory mechanisms in freshwater and marine teleosts.
  33. Explain the different methods of age and growth studies in fishes.
- .....

**MAHATMA GANDHI UNIVERSITY**

**THIRD SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME)**

**EXAMINATION ... (Year) ZA3V05U. vocational subject: Aqua culture course-5:**

**FISHERIES ENVIRONMENT (course code & course title). Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. .... is enrichment of a natural water body
  - a. Ammonification
  - b. Nitrification
  - c. Denitrification
  - d. Eutrophication
2. Tropical tidal wet lands are otherwise called .....
  - a. Lotic waters
  - b. Estuaries
  - c. Lentic waters
  - d. Mangroves
3. 'Minamata disease' is caused by ..... poisoning.
  - a. Cadmium
  - b. Mercury
  - c. Arsenic
  - d. Antimony
4. .... is the index of mobility of a liquid.
  - a. density
  - b. salinity
  - c. surface tension
  - d. viscosity
- .....
5. .... Is a branch of science which deals with various aspects of atmosphere.
  - a. Ecology
  - b. Metereology
  - c. Oceanography
  - d. Seismology
6. Ocean floor is otherwise termed ..... zone.
  - a. Benthic
  - b. Neritic
  - c. Pelagic
  - d. Oceanic
7. .... is not the driving force of producing monsoon.
  - a. Trade winds
  - b. Tilt of the earth
  - c. Temperature difference of land and sea
  - d. Oceanic currents
8. .... is not a sediment type.
  - a. Lithogenous
  - b. Biogenous
  - c. hydrogenous
  - d. Igneous rocks
- .....
9. Mud banks are otherwise called.....
  - a. Swamps
  - b. chakara
  - c. mangroves
  - d. Marshes

10. .... is not a subsurface level water mass in Indian ocean  
 a. Indian ventral mass                      b. Indian ocean equatorial water mass  
 c. Deep water mass                         d. pelagic water mass
11. .... are caused by the gravitational attraction of the moon and the sun on the earth  
 a. Waves                      b. Abrasion                      c. tides                      d. currents
12. One of the most widely used & accurate methods for estimating primary productivity by the measurement of CO<sub>2</sub> uptake is .....  
 a. O<sub>2</sub> bottle experiment.                      b. <sup>14</sup>C method  
 c. chlorophyll estimation                      d. Direct census method
- .....
13. .... is not a surface current of Indian Ocean  
 a. Drift current                      b. Equatorial current  
 c. Agulahs current                      d. Wave current
14. Red tide is formed by excessive blooming of .....  
 a. *Gonyaulax*                      b. *Thalassiothrix*  
 c. *Coscinodiscus*                      d. *Chaetoceros*
15. .... is not a micro nutrient.  
 a. Mg                      b. Ca                      c. Mn                      d. Si
16. .... is defined as the total soluble Ca & Mg salts present in the water  
 a. alkalinity                      b. hardness  
 c. salinity                      d. pH
- .....

### **PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Differentiate between weather and climate?  
 18. Define food web.  
 19. What is lotic habitat ? Cite two examples.  
 20. What is saprophytic food chain ?  
 21. How do sea breeze occur ?  
 22. What is an ecological pyramid ?  
 23. Write notes on the different types ocean currents.  
 24. Discuss the principal components of an aquatic food chain.

### **PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. How do Monsoons occur ?
26. Explain the economic importance of Holothurians.
27. Why seaweeds are considered as a marine resource ?
28. Explain the hydrological cycle with a neat diagram.
29. a. Estuaries are known as “nutrient traps”, why ?  
b. Describe the ecology of mangroves.
30. Give an account of Remote Sensing techniques and its application in marine environmental studies.

**PART D (Any 2)****(Essay type. Weightage 4 each)**

31. Describe any three methods to measure primary productivity.
  32. a. Give an account on the sediment transport in sea.  
b. Describe the different marine realms.
  33. Discuss the physical & chemical parameters that affect aquatic life.
-

**MAHATMA GANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME) EXAMINATION**  
**... (Year) ZA3V06U. vocational subject: Aqua culture course-6: FISH NUTRITION**  
*(course code & course title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. Trypsinogen is converted to trypsin in the presence of .....  
 a. enterokinase b. Pepsinogen c. Amylase d. Catalase
  2. .... is the energy content in food minus the energy lost in faecus, urine and excretion from gills.  
 a. Metabolisable energy b. Digestible energy c. Net energy  
 d. Retained energy
  3. Among the following food additives ..... is not a binder  
 a. Carboxymethyl cellulose b. Alginic acid  
 c. Collagen d. Ethoxyquin
  4. The calorific conversion factor for protein is .....  
 a. 5.65 Cal/g b. 4.1 Cal/g c. 9.4 Cal/g d. 5.6 Cal/g
- 
5. Food Conversion Ratio is  
 a. Weight of feed consumed/Increase in weight of the animal  
 b. Increase in weight of the animal/ Weight of the feed consumed  
 c. Gain in live weight of the animal/ proteins consumed  
 d. protein gained/ Protein consumed
  6. In Proximate analysis . monosaccharides, oligosaccharides and water soluble vitamins are included under  
 a. Crude Fibre b. Ether Extract c. Ash d. Nitrogen free extract
  7. Ascorbic acid and  $\alpha$  - tocopherol are  
 a. Chemo-attractants b. Feeding stimulants c. Antioxidants 4. Mould inhibitors
  8. Among the non-conventional feed stuffs ..... is used as a protein supplement on human diet.  
  
 a. Alfalfa b. Azolla c. Spirulina 4. Eichornia
- 
9. .... are antimetabolites that can cause clumping together of RBC  
 a. Cyanogens b. Gossypols c. Mimosine d. Haemagglutinins

10. The international unit of energy is  
a. Calorie b. Kelvin c. Watt d. Newton
11. .... is a tranquiliser that can be used as growth promoter  
a. Reserpine b. Triiodothyroxine c. Sodium Arsenilate d. Aspirin.
12. .... is not an equipment used in feed mills  
a.
- 
13. State which of the following statements is true.  
a. Crude protein is estimated by multiplying the nitrogen content of a sample by a conversion factor of 8.5  
b. Crude fibre contains Triglycerides and Phospholipids  
c. Cellulose and Chitin are included under Nitrogen-free extract  
d. Crude lipids refer to those materials that can be extracted by organic compounds solvents such as petroleum ether and chloroform
14. .... is a fat soluble vitamin  
a. Vitamin K b. Vitamin C c. Nicotinic acid d. Thiamine
15. .... Is a roller mill with rolls specially designed to break up pellets into smaller particles.  
a. Sifter b. Sprayer c. Crumbler d. Drier
16. .... is not a method for measuring the calorific value of feeds.  
a. Wet Oxidation b. Bomb Calorimetry c. Component analysis d. Kjeldahl method
- 

### **PART B (Any 5)**

#### **(Short answer question. Weightage 1 each)**

17. Write a short note on the digestion of carbohydrates and fats
18. What are trace elements? Mention the functions and deficiency diseases of any two.
19. What is proximate analysis? What are the different classes of compounds estimated in proximate analysis?
20. What are grinders? Distinguish between plate mills and Hammer Mills.
21. What is linear programming? How is it applied in feed formulation.
22. Give a brief account of non conventional feed stuffs used in aquatic feeds?
23. Explain any three indices used for measurement of protein utilization
24. write a short note on the nutritional requirement of carps at different stages of their life history.

### **PART C (Any 4)**

#### **(Short essay/problem solving type. Weightage 2 each)**

25. What is PEARSON'S SQUARE METHOD? How is it utilised in diet formulation. Draw a Pearson Square to formulate a feed having 16 % protein, using two ingredients, Mantis shrimp meal (40 % protein) and corn gluten (8 % protein).
26. What are non-nutrient components of the diet? Write short notes on Antimetabolites and Non-Toxic dietary components.
27. Describe the different types of stationary fish feeding devices.

28. Describe the digestive system of a teleost fish with a neat labelled diagram. Comment on the modifications of the digestive system in herbivorous and carnivorous fishes with regard to differences in their feeding habit.
29. Elaborate on the different factors affecting the digestibility of feeds.
30. What is energy budgeting? Write notes on the different components of the energy budget.

**PART D (Any 2)**

**( essay type. Weightage 4 each)**

31. Describe different steps involved in feed preparation?
  32. Describe the different techniques used for the measurement of the calorific value of aquatic feeds.
  33. What are feed additives. Elaborate on the diverse feed additives used in aquatic feed formulation with examples and notes on their functions.
- .....

**MAHATMA GANDHI UNIVERSITY**  
**FOURTH SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME) EXAMINATION**  
 ... (Year) ZA4V07U. vocational subject **Aqua culture course-7:REPRODUCTIVE**  
**PHYSIOLOGY AND ENDOCRINOLOGY** (course code & course title).

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. Gonad inhibiting hormone in crustaceans is produced by  
 a. Sinus Gland b. Green Glands c. Y-Organ d. Androgenic Gland
2. ----- hormone is used for sex reversal to males in Tilapia  
 a. Alpha Methyl Testosterone b. Diethylstilbestrol c. Corticosteroids  
 d. Chorionic Gonadotropin
3. ----- is an example for a Protandrous hermaphrodite  
 a. *Lates calcarifer* b. *Epinephelus tauvina* c. *Protonibea diacanthus*  
 d. *Pampus argenteus*
4. ----- is not a neuroendocrine organ  
 a. Neurohypophysis b. Sinus Gland c. Pericardial Organs  
 d. Y-Organ
5. ----- Among the following ..... Is not an hormone produced by the  
 sinus gland in crustaceans  
 a. Neurohypophysis b. Sinus Gland c. Pericardial Organs  
 d. Y-Organ
6. .... is not a permeating cryoprotectant  
 a. Dimethyl sulphoxide b. Propylene glycol c. Glycerol  
 d. Polyvinyl pyrrolidone
7. Fishes that spawn in the water column are known as

- a. Lithophils b. Phytophils c. Psammophils d. Ostraciphils
8. Puberogen, a hormone used in the induced breeding of sea bass is a combination of  
 a. FSH and LH b. LH and LTH c. Estrogen and FSH  
 d. Testosterone and estrogen
- .....
9. Epiboly is.....  
 a. A type of cleavage b. A process in Gastrulation  
 c. A diseased condition d. An embryonic structure
10. In Crustaceans, moulting hormone secreted by.....  
 a. Androgenic gland b. Y-organ  
 c. X-organ Sinus gland complex d. Mandibular Organ
11. .... was the first country to develop the technique of hypophysation  
 a. Brazil b. India c. India d. China
12. Petasma is present in.....  
 a. Male penaeid prawn b. Female penaeid prawn  
 c. Male caridean prawn d. Female caridean prawn
- .....
13. .... is a neurosecretory system in Crustacea  
 a. Y-organ b. Statocyst c. Green glands d. Pericardial organs
14. .... Is not an anaesthetic used in fish culture  
 a. MS 222 b. Quinaldine  
 c. Metomidate Hydrochloride d. Spiperone
15. Human Chorionic Gonadotropin, HCG, is produced by the .....  
 a. Placenta b. Ovary c. Pineal Gland d. Testes
16. Haloperidol and Pimozide are examples of .....  
 a. Gonadotropins b. Sex Steroids  
 c. Dopamine Antagonists d. Releasing Hormones
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Describe the classification of maturity stages in a teleost fish.
18. What is the principle behind eye-stalk ablation? How is eye-stalk ablation practiced in crustacean hatcheries
19. What is LINPE method? How is it useful in fish breeding? Name a commercial product that the principle of Linpe method.
20. What is a fate map? Explain with diagram.
21. Describe the sexual dimorphic features of penaeid and caridean prawns?

22. What is hermaphroditism? Write notes on the different types of hermaphroditism seen in fishes.
23. What is a dopamine antagonist? Explain its functions.
24. What are anaesthetics? Give examples. Explain their use in fish breeding.

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. What is hypophysation? Elaborate the different steps involved in the hypophysation of Indian major carps.
26. What are the different environmental factors influencing the maturation of prawns?
27. Describe the hormonal control of moulting and reproduction in crustaceans.
28. Explain the different systems of sex determination in fishes.
29. Write short notes on the non-neural endocrine organs in Crustaceans.
30. Briefly describe the structure of pituitary in fishes and its role in reproduction.

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

31. What are the advantages of cryopreservation? Briefly describe the different steps involved in the cryopreservation of fish gametes.
  32. Describe briefly the embryonic and post embryonic development in fishes.
  33. What are the different neuroendocrine systems in crustaceans? Explain the structure and function of each with labelled diagrams.
- .....

**MAHATMA GANDHI UNIVERSITY**

**FOURTH SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME) EXAMINATION**

... (Year) ZA4V08U. vocational subject: Aqua culture course-8. **MICROBIOLOGY, PATHOLOGY AND POST HARVESTING TECHNOLOGY** (course code & course title).

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. Typhoid is caused by .....  
a. E.coli      b. Vibrio      c. Salmonella      d. Staphylococcus
  2. "Appertisation" is the term used for .....  
a. canning      b. curing      c. drying      d. freezing
  3. Dropsy disease is caused by .....  
a. viroous      b. fungus      c. protozoan      d. bacteria
  4. .... can be prevented by the addition of antioxidant to fresh fish  
a. Rigor mortis      b. Rancidity      c. Autolysis      d. Microbial spoilage
- .....
5. Moisture content of ..... is 90 %.  
a. pomfret      b. bombay duck      c. cat ish      d. sharks
  6. Halotolerant fungi growing on salt dried fish is .....  
a. *Sarcina littoralis*      b. *Serratea salinaria*  
c. *Sporendonema epizooum*      d. *Pseudomonas*
  7. Two pathogenic organisms in natural bacterial flora of marine fish  
a. *Vibrio parahaemolyticus* & *Vibrio cholerae*  
b. *Vibrio cholerae* & *Salmonella*  
c. *Salmonella* & *Staphylococcus*  
d. *Vibrio paralhaemolyticus* & *Clostridium*
  8. Gram positive organisms attain ..... colour in the gram staining.  
a. pink      b. violet      c. green      d. yellow
- .....

9. 'Sublimation' is the process involved in ..... type of preservation  
 a. Freezing                      b. Canning  
 c. Drying                         d. Freeze drying
10. End product of ATP degradation is .....  
 a. IMP                      b. Inosine                      c. AMP                      d. Hypoxanthine
11. 'Botulism' is caused by the organism .....  
 a. *Clostridium*   b. *Salmonella*   c. *Staphylococcus*   d. *Vibrio*
12. Gaseous spoilage of canned products is .....  
 a. flipper                      b. springer  
 c. soft swell                      d. hard swell
- 
13. Gill rot disease is caused by .....  
 a. *Branchiomyces*                      b. *Saprolegnia*  
 c. *Brachionus*                      d. *Sarcina littoralis*
14. Death stiffening is called.....  
 a. Rancidity                      b. Rigor mortis  
 c. Spoilage                      d. Protein denaturation
15. Epizootic Ulcerative syndrome (EUS) is a ..... disease  
 a. bacterial                      b. viral   c. fungal                      d. protozoan
16. The attractive flavour of prawns & other crustaceans is due to their higher content of .....  
 a. Free alpha amino acids                      b. Protein  
 c. Myosin                      d. NPN compounds
- 

### **PART B (Any 5)**

#### **(Short answer question. Weightage 1 each)**

17. Write a short note on fungal diseases of fresh water fishes.  
 18. What is monacuring & how does it differ from the other types of curing methods ?  
 19. Differentiate between quick freezing & slow freezing.  
 20. What are pathogens ? Cite examples.  
 21. Briefly explain autolysis.  
 22. Mention any four pathological changes noticed in fish tissues.  
 23. Write the symptoms of white spot disease.  
 24. a. Describe spoilage  
 b. Mention the indices of spoilage

### **PART C (Any 4)**

#### **(Short essay/problem solving type. Weightage 2 each)**

25. Briefly explain the different types of freezers. Write a short note on IQF.  
 26. a. Describe the different steps in canning  
 b. Mention the problems involved.  
 27. a. Describe the principle and technique involved in curing  
 b. write short note on different types of curing

28. a. Write an essay on sterilization techniques  
b. Mention its significance in microbiology.
29. a. What is rigor mortis.  
b. Mention the important changes during rigor mortis.
30. a. What is TPC  
b. Briefly explain the different steps involved in the procedure.  
c. Mention its significance.

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

31. Write an essay on food poisoning in sea food industry. How the introduction of Haccp eliminate the above said Hazards ?
  32. Describe the important parasitic diseases of fish and their remedial measures.
  33. a. Give a detailed description of the biochemical composition of raw fish.  
b. How does the fish become spoiled ?
-

**MAHATMA GANDHI UNIVERSITY**

**FIRST SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME) EXAMINATION**

... (Year) ZF1V01U/ZM1V01U. vocational subject: **Medical Microbiology/Food**

**Microbiology. Course 1- GENERAL MICROBIOLOGY** (course code & course title).

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

- 1 The agents used to prevent the multiplication of bacteria is called
 

|                |                  |
|----------------|------------------|
| a Antiseptic   | b Bacteriostatic |
| )              | )                |
| c bactericidal | d disinfectant   |
| )              | )                |
- 2 Which of the following sterilization method work under the principle of moist heat
 

|                |               |
|----------------|---------------|
| a Autoclave    | b Incinerator |
| )              | )             |
| c Hot air oven | d Sun drying  |
| )              | )             |
- 3 The method used for sterilizing serum is .....
 

|               |                  |
|---------------|------------------|
| a Autoclaving | b Incineration   |
| )             | )                |
| c Filtration  | d pasteurization |
| )             | )                |
- 4 The chief constituent of agar is .....
 

|                  |             |
|------------------|-------------|
| a Polysaccharide | b Fat       |
| )                | )           |
| c Phosphate      | d potassium |
| )                | )           |



- 2 bacteriophage is  
 a Transformation ) b Conjugation  
 c Transduction ) d Mutation  
 ) )
- 1 Which one of the following organism is acid fast
- 3  
 a *E.coli* ) b Pseudomonas  
 c Clostridium ) d Mycobacterium  
 ) )
- 1 Cell wall deficient bacteria is ....
- 4  
 a Staphylococcus ) b *E coli*  
 c Mycoplasma ) d Yersinia  
 ) )
- 1 Arrangement of cocci in chain is .....
- 5  
 a Streptococci ) b Staphylococci  
 c Sarcina ) d Tetrads  
 ) )
- 1 Ribosomes of bacteria is
- 6  
 a 70 s ) b 80 s  
 c 60 s ) d 90 s  
 ) )

### Part B

**(Short answer type questions -Weight 1 each. Answer Any 5)**

17. Define sterilization
18. Differentiate between prokaryotes and eukaryote.
19. What is meant by generation time?
20. Differentiate between an enriched and enrichment media

21. What is spheroplast?
22. What are transposons?
23. Differentiate between a spirochete and spirillum
24. What is a differential media?

### Part C

**(Short essay - weight 2 each. Answer any 4)**

25. Write the principle and procedure of gram staining. Give one example for each, gram +ve and gram -ve
26. Describe the different culture techniques
27. Explain the structure and composition of bacterial cell wall.
28. Classify bacteriae nutritionally
29. Classify bacteria based on their DNA homology
30. Explain the methods of transfer of genetic material among bacteria

### Part D

**(Essay type - weight 4 each. Answer any 2)**

31. Give an account of the different sterilization methods used in microbiology laboratory.
  32. Describe briefly the different stages of bacterial growth curve.
  33. Classify bacteriae according to Bergey's manual.
- .....

## MAHATMA GANDHI UNIVERSITY

**FIRST SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME) EXAMINATION ...**

**(Year) ZF1V02U/ZM1V02U. vocational subject: Medical Microbiology/Food**

**Microbiology. Course 2- BIOINSTRUMENTATION (course code & course title).**

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper****Part A (Objective type. Weightage 1 each for a bunch of four)**

1. Father of microscopy
  - a. Robert Koch b) Louis Pasteur c) Antonie Van Leeuwenhoek d)Edward Jenner
  
2. Phase contract microscope was developed by
  - a) Frederick Zernike b) Francesco Redi c)John Needham d)Lazaro Spallanzani
  
3. The ability to distinguish 2 adjacent points as distinct and separate is termed as
  - a. Numerical aperture b) Resolving power c) Angular aperture d) limit of resolution
  
  
4. The transparent vessel used to hold the sample in colorimetry
  - a. Test tube b) Pipette c) cuvette d) screw capped bottle

.....
  
5. Inventor of micrometer
  - a. Robert Hooke b) Robert Koch c)Willam Gascoigne d) William Beijerinck
  
6. Name the organism used as stealisation control in autoclave
  - a. *Bacillus Stereothermophilus* b) *Bacillus thuringiensis* c) *Clostridium tetani* d) *Aspergillus niger*
  
7. The dye molecule used to stain specimens in fluroscence microscopy
  - a. Auxochrome b) Flurochrome c) chromophore d) neutral dye
  
8. Separations carried out in a homogenous suspending medium
  - a. Differential certifugation b) preparative centrifugation c) density gradient centrifugation d) analytical centrifugation

.....

9. Electron microscope was invented by
- Fannie Elashemius and Walther Hesse
  - Max Knoll & Ernest Ruska
  - E.V Behring & S. Kitasato
  - S.N Winogradsky & M.W Beijernick
10. The distance between the front surface of the objective lens and the surface of the cover glass or specimen
- Focal length
  - Working distance
  - focal point
  - numerical aperture
11. The component of spectrophotometer which break the polychromatic radiation into bands of wavelength is
- Photosensitive detector
  - recorder
  - monochromator
  - amplifier
12. An example for basic dye is
- Rose Bengal
  - Eosin
  - acid fuschin
  - methylene blue
- .....
13. The unit used for sedimentation rate
- Angstrom
  - Svedberg
  - nanometer
  - picometer
14. Absorbance of light in solution is represented as
- Angular velocity
  - Optical density
  - density gradient
  - refractive index
15. Annular stop is present in the condenser of
- Fluorescence microscope
  - dark field microscope
  - electron microscope
  - phase contrast microscope
16. The quantity  $n \sin \alpha$  is called
- Angular aperture
  - resolution factor
  - numerical aperture
  - refractive index
- .....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. Define fluorescence

18. What is relative centrifugal force?
19. HEPA filter
20. What is the function of barrier filter
21. Define pH
22. Beers Lamberts law
23. Auxochrome
24. Define numerical aperture

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2each)**

25. Explain the special devices used in dark field microscope
26. Describe the working of pH meter
27. Explain the vacuum system and electron gun used in transmission electron microscope
28. Applications of centrifugation in biological science
29. Principle and instrumentation of colorimeter
30. Explain the principles and use of hot air oven.

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

- 31 Explain the specimen preparation for electron microscopy.
32. Describe the instrumentation for UV-visible and infra red spectrophotometry.
33. Brief explain the methods and types of preparative centrifugation.

.....

**MAHATMA GANDHI UNIVERSITY**  
**SECOND SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME)**  
**EXAMINATION ... (Year ZF2V03U/ZM2V03U. vocational subject: Medical**  
**Microbiology/Food Microbiology. Course 3- GENERAL METHODOLOGY (course**  
*code & course title).* **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. The colour producing reagent sprayed on the paper for the detection of amino acids in paper chromatography.
 

|               |              |
|---------------|--------------|
| a. Methanol   | b. Ninhydrin |
| c. Chloroform | d. Acetone   |
  2. Isoelectric focussing technique was discovered by
 

|                   |              |
|-------------------|--------------|
| a. H.Svensson     | b. K.Grabar  |
| c. Michael Tswett | d. S.William |
  3. Immunodiffusion is a modification of
    - a. Oakley-Fulthrope procedure
    - b. Ouchterlony double diffusion technique
    - c. Radial immuno diffusion
    - d. Oudin single diffusion technique
  4. The order of ability to induce ionization decreases in the order
 

|                              |                              |
|------------------------------|------------------------------|
| a. $\alpha > \beta > \gamma$ | b. $\gamma > \alpha > \beta$ |
| c. $\alpha > \gamma > \beta$ | d. $\beta > \alpha > \gamma$ |
- .....
5. The first detailed description of chromatography was done by
 

|              |                 |
|--------------|-----------------|
| a. H.Svenson | b. Svedberg     |
| c. M.Tswett  | d. B.H.Nicolson |

6. Half life of carbon-14
- a. 5000 years
  - b. 15 days
  - c. 80 days
  - d. 2.9 years
7. A fermenter used for continuous production of beer
- a. tower fermenter
  - b. tubular fermenter
  - c. batch fermenter
  - d. solid fermenter
8. The aerating device used in fermenter
- a. Baffles
  - b. impellor
  - c. Sparger
  - d. Reservoir
- 
9. The stationary phase used in thin layer chromatography
- a. Kieselghur
  - b. Aluminium
  - c. Phosphur gel
  - d. Sephadex
10. The pH gradient may be obtained by electro focusing special buffer substances known as
- a. hydroxy appetite
  - b. ampholyte
  - c. polyacrilamide
  - d. sephadex
11. The phenomena of natural radioactivity was discovered by
- a. Henry Becquerel
  - b. Madam Curie
  - c. A.J.P.Martin
  - d.
12. Affinity chromatography exploits the capacity of biomolecules for specific, non covalent binding with specific molecules called
- a. agarose
  - b. ligands
  - c. slurry
  - d. polyacrylamide
- 
13. A reaction in which one of the products of the reaction increases the overall rate of a reaction
- a. biocatalytic
  - b. autocatalytic
  - c. autolytic
  - d. bioenzymatic
14. The principle of paper chromatography is



**MAHATMA GANDHI UNIVERSITY**  
**SECOND SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME)**  
**EXAMINATION ... (Year) ZF2V04U/ZM2V04U. vocational subject: Medical**  
**Microbiology/Food Microbiology. Course 4- ENVIRONMENTAL AND**  
**AGRICULTURAL MICROBIOLOGY (course code & course title).**

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. The genetically engineered “super bug” is
 

|                                     |                              |
|-------------------------------------|------------------------------|
| a. <i>Proteus mirabilis</i>         | b. <i>Pseudomonas putida</i> |
| c. <i>Thiobacillus ferrooxidans</i> | d. <i>Penicillium</i>        |
  2. *Rhizobium* – legume association is an example for
 

|               |                |
|---------------|----------------|
| a. Mutualism  | b. Amensalism  |
| c. Parasitism | d. Competition |
  3. The sewage treatment done to reduce BOD
 

|                        |                        |
|------------------------|------------------------|
| a. Tertiary treatment  | b. primary treatment   |
| c. Secondary treatment | d. Anaerobic treatment |
  4. The filtering medium of trickling filter gets coated with
 

|                  |                   |
|------------------|-------------------|
| a. Zoogical film | b. Algal film     |
| c. Fungal film   | d. Waste material |
- .....
5. VAM is an
 

|                    |                    |
|--------------------|--------------------|
| a. Ectomycorrhizae | b. Endomycorrhizae |
| c. Amensalism      | d. Parasitism      |

6. The secondary treatment designed to allow algal growth on waste water effluent
- a. Trickling filter
  - b. Activated sludge treatment
  - c. Anaerobic sludge digester
  - d. Oxidation pond
7. An example of bacterial insecticide
- a. *Bacillus thuringiensis*
  - b. *Pseudomonas putida*
  - c. *Thiobacillus ferrooxidans*
  - d. *Fusarium solani*
8. A relationship between 2 microbial population in which one is benefited and other remains unaffected
- a. Amensalism
  - b. Commensalism
  - c. Synergism
  - d. Mutualism
- 
9. *Verticillium lecanii* is an example for
- a. Viral insecticide
  - b. Bacterial insecticide
  - c. Fungal insecticide
  - d. Biofertilizer
10. The *Cyanobacterium* which lives in symbiosis with free floating water fern *Azolla*
- a. *Anabaena variabilis*
  - b. *Nostoc*
  - c. *Plectonema*
  - d. *Anabaena azollae*
11. Antibiotic production by a microorganism and inhibiting or killing of other microorganism susceptible to that antibiotic is an example of
- a. Mutualism
  - b. Commensalism
  - c. Amensalism
  - d. Parasitism
12. An obligatory microbial interaction :
- a. Mutualism
  - b. Synergism
  - c. Amensalism
  - d. Parasitism
- 
13. A polymer which is naturally synthesized by certain bacteria
- a. Polyvinyl chloride
  - b. Poly hydroxyl butyrate
  - c. Polyethylene
  - d. Polystyrene
14. An example of VAM

- a. *Aspergillus*                      b. *Glomus*  
c. *Amantia*                            d. *Rhizopus*

15. The enzyme which degrade starch

- a. Cellulase                              b. Peptidase  
c. Amylase                                d. Peroxidase

16. A pile of rocks over which organic wastes slowly trickle.

- a. Oxidation pond                      b. Trickling filter  
c. Membrane filter                      d. Sludge digester

.....  
**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is synergism ?  
18. Name 2 viral insecticides  
19. Short note on anaerobic sludge digester.  
20. What are Xenobiotics ?  
21. What is stabilization pond ?  
22. Mention the methods employed for aerobic secondary sewage treatment.  
23. What is amensalism ?  
24. Comment on the Sewage microorganisms.

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Briefly describe vesicular-arbuscular mycorrhizae.  
26. Explain the activated sludge treatment  
27. Difference between BOD and COD.  
28. Explain briefly the biodegradation of petroleum pollutants.  
29. Write a short note on the positive microbial interactions with examples.  
30. Explain in brief the biodegradation of plastics.

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Define biodegradation. Write a short note on the biodegradation of natural organic compounds.  
32. Comment on micro organisms in soil and air highlighting the role of soil micro organisms  
33. Write an account on the production of biofertilizers.  
.....

**MAHATMA GANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME)**  
**EXAMINATION ... (Year) ZF3V05U. Vocational subject: Food Microbiology.**  
**Course 5- DAIRY MICROBIOLOGY (course code & course title).**

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

- 1 The time and temperature used in HTST method of pasteurization is .....
 

|                   |                     |
|-------------------|---------------------|
| a 72°C for 15 sec | b 62.8°C for 30 min |
| )                 | )                   |
| c 72°C for 30 min | d 62.8°C for 1 min  |
| )                 | )                   |
- 2 Rapid heating of the cream by injecting steam or by a combination of steam injection and evacuation is known as .....
 

|                  |                       |
|------------------|-----------------------|
| a Pasteurization | b Vacreation          |
| )                | )                     |
| c Sterilization  | d Ultrapasteurization |
| )                | )                     |
- 3 Added sugar act as a preservative in sweetened condensed milk because the sugar reduces....
 

|                 |           |
|-----------------|-----------|
| a pH            | b Air     |
| )               | )         |
| c O-R potential | d Surface |
| )               | )         |
- 4 Milk sugar is .....
 

|           |           |
|-----------|-----------|
| a sucrose | b lactose |
| )         | )         |





**Part B****(Short answer type questions -Weight 1 each. Answer Any 5 )**

17. What is HTST method of pasteurization ?
18. What is lassie?
19. What is casein?
20. What is colostrum?
21. What is acidophilus milk?
22. What is meant by skim milk?
23. What is Kefir and Kumiss?
24. What is meant by stormy fermentation?

**Part C****(Short essay - weight 2 each. Answer any four)**

25. Describe the different methods of pasteurization.
26. Explain the properties of milk.
27. Write notes on lactic starter culture.
28. Describe the preparation of cheese
29. Which are the sources of contamination of milk?
30. Describe the different spoilages of milk.

**Part D****(Essay type - weight 4 each. Answer any two)**

31. Classify the different types of microorganisms found in milk.
  32. Describe various milk borne diseases and their control measures.
  33. Give a detailed description of various fermented milk products and their spoilage.
- .....

**MAHATMA GANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME)**  
**EXAMINATION ... (Year) ZF3V06U. Vocational subject: Food Microbiology.**  
**Course 6- MICROBIOLOGY OF SPOILAGE OF FOOD, METHODS OF**  
**PRESERVATION OF FOOD AND MICROBIOLOGICAL EXAMINATION**  
**OF FOOD(course code & course title).**

**Total weightage: 25**

**Instructions:**

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

- 1 The organisms which can grow either aerobically or anaerobically are called
 

|             |               |
|-------------|---------------|
| a Aerobes   | b Anaerobes   |
| )           | )             |
| c Obligates | d facultative |
| )           | )             |
- 2 ..... is an asexual spore of mould
 

|             |                  |
|-------------|------------------|
| a Conidia   | b Zygosporangium |
| )           | )                |
| c Ascospore | d Oospores       |
| )           | )                |
- 3 ..... is a sexual spore of mold
 

|                 |               |
|-----------------|---------------|
| a Conidia       | b Arthrospore |
| )               | )             |
| c Chlamydospore | d Ascospore   |
| )               | )             |
- 4 The organism which grow at refrigeration temperature is
 

|                 |              |
|-----------------|--------------|
| a Psychrophilic | b Mesophilic |
| )               | )            |
| c Osmophilic    | d halophilic |
| )               | )            |

- ) )
- 5 Bread mold is .....  
 a Rhizopus b Aspergillus  
 ) )  
 c Penicillium d Mucor
- ) )
- 6 Red bread mold is .....  
 a Rhizopus b Neurospora  
 ) )  
 c Aspergillus d Botrylis
- ) )
- 7 The presence of ..... in bacteria causes ropiness in food  
 a flagella b capsule  
 ) )  
 c Cell wall d Pili
- ) )
8. The bacteria which require certain minimal concentration of dissolved sodium chloride for their growth are ....  
 a Halophiles b Osmophilic bacteria  
 ) )  
 c Thermophiles d Thermoduric bacteria
- ) )
- 9 The bacteria which grow at high concentrations of sugar is called  
 a Halophiles b Osmophilic bacteria  
 ) )  
 c Thermophiles d Psychtrophiles
- ) )
- 10 The food which do not spoil unless handled carelessly are.....  
 a Perishable food b Semi perishable food  
 ) )  
 c Stable food d Low acid foods
- ) )
- 11 The association between 2 organisms in which one makes conditions favourable for the growth of second is called.....  
 a Antagonism b Symbiosis  
 ) )  
 c Metabiotic d Synergism  
 ) )



20. What is an indicator organism? Give example
21. Comment on oxidation reduction potential
22. What is shelf life of a food?
23. Explain the different types of food.
24. Explain the role of inhibitory substance in food microbiology.

### **Part C**

#### **(Short essay - weight 2 each. Answer any four)**

25. Which are the chemical changes produced by microorganisms in food spoilage?
26. Explain the various sources of contamination of food.
27. Explain the factors that affect the kind and number of organisms in food.
28. What are the changes occurring in food during thawing
29. Explain how food is preserved by applying high temperature
30. Comment on food additives.

### **Part D**

#### **(Essay type - weight 4 each. Answer any two)**

31. Briefly describe the various methods for the microbiological examination of food
32. Describe the principles of food preservation
33. Explain in detail about the important groups of bacteria associated with various foods.

.....

**MAHATMA GANDHI UNIVERSITY**  
**FOURTH SEMESTER B.Sc ZOOLOGY (PROGRAMME) EXAMINATION ... (Year)**  
**ZF4V07U. Vocational subject: Food Microbiology.**  
**Course 7- MICROBIOLOGY OF CEREALS, BEVERAGES, EGG, MEAT**  
**AND FERMENTED FOOD (course code & course title).**

**Total weightage: 25**

**Instructions:**

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

- 1 The spoilage caused by *Serratia marcescens* in bread is
 

|                       |                |
|-----------------------|----------------|
| a Red or bloody bread | b Blue bread   |
| )                     | )              |
| c roppiness           | d Yellow bread |
| )                     | )              |
- 2 The type of wine which contain little or no unfermented sugar is
 

.....

|                  |              |
|------------------|--------------|
| a Dry wine       | b Sweet wine |
| )                | )            |
| c Fortified wine | d Table wine |
| )                | )            |
- 3 Botulism is caused by the species of .....
 

|                  |               |
|------------------|---------------|
| a Bacillus       | b Clostridium |
| )                | )             |
| c Staphylococcus | d Shigella    |
| )                | )             |
- 4 Staphylococcus food poisoning is due to the injection of .... toxin
 

|               |              |
|---------------|--------------|
| a endotoxin   | b exotoxin   |
| )             | )            |
| c enterotoxin | d neurotoxin |



- 1 Gray mold rot in vegetable is caused by .....
- 2
- |                |                   |
|----------------|-------------------|
| a Botrytis spp | b Alternaria spp  |
| )              | )                 |
| c Fusarium spp | d Aspergillus spp |
| )              | )                 |
- 1 Bacterial soft rot of vegetable is caused by .....
- 3
- |               |                  |
|---------------|------------------|
| a Erwinia spp | b Staphylococcus |
| )             | )                |
| c Rhizopus    | d Aspergillus    |
| )             | )                |
- 1 Sauerkraut is a fermented
- 4
- |           |               |
|-----------|---------------|
| a Cabbage | b Cauliflower |
| )         | )             |
| c Carrot  | d Potato      |
| )         | )             |
- 1 The early stage of fungal spoilage in egg is termed
- 5
- |                    |                               |
|--------------------|-------------------------------|
| a Pin spot molding | b Superficial fungal spoilage |
| )                  | )                             |
| c Rotting          | d Fungal rotting              |
| )                  | )                             |
- 1 Contamination of grains by ascomycete *Claviceps purpurea* cause
- 6
- |            |            |
|------------|------------|
| a Rotting  | b Ergotism |
| )          | )          |
| c Soft rot | d Red rot  |
| )          | )          |

### Part B

**(Short answer type questions -Weight 1 each. Answer any 5. )**

17. What is food and fodder yeast?
18. What is meant by acetification of wines?
19. What are the symptoms of Staphylococcal food poisoning?.

20. What is Botulism?
21. What are mycotoxins?
22. Define intoxicants.
23. What are malt beverages?
24. What is cigvetera poisoning?

### **Part C**

**(Short essay - weight 2 each. Answer any four)**

25. Write short notes on oriental fermented foods.
26. What is SCP and its nutritional value?
27. Comment on the spoilage of egg.
28. Discuss the role of bacteria in food borne disease.
29. Briefly explain HACCP
30. Write a note on fermented vegetables

### **Part D**

**(Essay type - weight 4 each. Answer any two)**

31. Explain the various stages of mushroom production.
  32. Give a detailed account on contamination, preservation and spoilage of fish.
  33. Give an account on preservation and spoilage of cereal grains.
- .....







**Part B****(Short answer type questions -Weight 1 each. Answer any 5.)**

17. Define lyophilization
18. What is serial sub culturing?
19. What is fermentation?
20. Name the microbe used for producing Lysine.
21. What is homofermentation? Give one example
22. Mention the scope of industrial microbiology.
23. Elaborate the experiments of Pasteur
24. What is biotechnology?

**Part C****(Short essay - weight 2 each. Answer any four)**

25. What are metabolites ? Write notes on primary and secondary metabolites.
26. Elucidate the method of production of any antibiotic
27. Explain the method of production of lactic acid
28. Briefly describe the discovery of anaerobic life.
29. Describe the recent developments in industrial microbiology.
30. Briefly describe the process of fermentation technology

**Part D****(Essay type - weight 4 each. Answer any two )**

31. Describe in detail the industrial production of acetic acid.
32. Describe the various methods for the storage of industrially important microbes
33. Describe the industrial production of vitamins.

**MAHATMA GANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME)**  
**EXAMINATION ... (Year) ZM3V05U. Vocational subject: Medical Microbiology.**  
**Course 5- PARASITOLOGY (course code & course title).**

**Total weightage: 25**

**Instructions:**

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. An association in which the parasite only derives the benefit without causing any injury to the host

- a) symbiosis b) commensalism c) parasitism d) predation

2. The parasite which attacks an unusual host

- a) Accidental parasite b) Obligate parasite c) facultative parasite d) Aberrant parasite

3. *Leishmania donovani* causes

- a) Chagas disease b) Kala-azar c) African sleeping sickness d) Trypanosomiasis

4. Example for ciliate protozoa

- a) *Trypanosoma cruzi* b) *Balantidium coli* c) *Toxoplasma gondi* d) *Enteromonas*

.....

5) The major blood fluke which parasitizes man

- a) *Fasciolopsis* b) *Schistosoma haematobium* c) *Fasciola* d) *Echinococcus*

6. The whip worm is the common name of

a) *Trichinella spiralis* b) *Trichuris trichura* c) *Strongyloides* d) *Ancylostoma*

7. Other name for *Dracunculus mediniensis*

a) Guinea worm b) Roundworm c) Thread worm d) Flat worm

8. Elephantiasis is caused by

a) *Wuchereria bancrofti* b) *Brugia malayi* c) *Onchocera volvules* d) *Mansonella perstans*

9. The host which only harbours the parasite but without any further development is called

a) Reservoir host b) Natural host c) Accidental host d) paratenic host

10. The parasite shows 'alternation of generation accompanied by 'alternation of hosts'

a) *Plasmodium* b) *Balantidium cdi* c) *Eimeria* d) *Toxoplasma*

11. Infective form of *Taenia solium*

a) Filariform larvae b) cysticercus cellulosae c) metacercariae d) miracidium

12. Intermediate host of *Shistosoma haematobium*

a) Man b) fresh water plants c) fresh water snails d) fresh water crab

13. Filariasis in which microfilaria are not found in the peripheral blood

a) Acute filariasis b) occult filariasis c) Tropical pulmonary eosinophilia d) Chronic filariasis

14. perianal pruritus ( pruritus ani) is the most common symptom of  
(a) ascariasis (b) Entrobiasis (c)  
Trypanosomiasis(d) lymphatic filariasis

- 15 . Female worms laying the larvae are called  
 (a) oviparous (b) viviparous  
 (c) ovo viviparous (d) gravid female
16. An outer hyaline ,non cellular layer forming the integument of nematodes  
 (a) plasma membrane (b) cuticle (c) cell membrane (d) cyst wall.

.....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is symbiosis
18. Name any two pathogenic flagellate protozoan of human intestine
19. What are hydatid cysts ?
20. Excystation and encystations ?
21. What are hypnozoite ?
22. What is hydrocoele ?
23. Autoinfection
24. Nocturnal periodicity

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. With the help of diagram explain the morphological shapes of *Entamoeba histolytica*
26. Laboratory diagnosis and treatment of Giardiasis
27. Write short notes on morphological stages of haemoflagellates
28. Briefly explain the lifecycle of *Trypanosoma cruzi*
29. Briefly explain the morphological stages of *Plasmodium falciparum* present in mosquito.

30. Treatment and preventive measures of toxoplasmosis

**PART D (Any 2)**

(Essay type. Weightage 4 each)

31. Briefly explain the morphology and life cycle of *Strongyloides stercoralis*

32. Explain the various methods of examination of blood parasites

33. Write an account on the life history of *Plasmodium vivax*.

.....

**MAHATMA GANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME) EXAMINATION**  
 ... (Year) ZM3V06U. Vocational subject: Medical Microbiology.  
**Course 6- MEDICAL ENTOMOLOGY AND MYCOLOGY**  
 (course code & course title). **Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. Mosquitoes belong to the order:
  - a. Hemiptera b) Diptera c) sipphonoptera d) cyclopoida
2. The balancing organ in the house fly
  - a. Claspers b) pedicel c) halteres d) ovipositor
3. The media used for the primary isolation of *Cryptococcus neoformans*
  - a. Corn meal agar b) rice starch agar c) Kelley agar d) Bird seed agar
- 4) Production of germ tube is a presumptive test for the identification of:
  - a) *Candida albicans* & *C.stellatoidea* b) *C.albicans*& *C.krusei* c) *C.albicans* & *C.glabrata*
  - d) *C.neoformans*

.....
- 5) Chlamydospore formation is detected in
  - a) Bird seed agar b)Potato dextrose agar c)rice starch agar d) Blood agar
- 6) The mosquito which lays boat shaped eggs:

a) *Culex* b) *Mansonia* c) *Aedes* d) *Anopheles*

7) Tsetse flies belongs to the genus

a) *Glossina* b) *Phlebotomus* c) *Cimex* d) *Pediculus*

8) Cyclops acts as a vector of the parasite

a) *Wuchereria* b) *Dracunculus* c) *Plasmodium* d) *Toxoplasma*

.....

9) Scientific name of head louse

a) *Pediculus humanus* b) *Pediculus humanus capitus* c) *Cimex hemipterus* d) *Pthirus pubis*

10) Etiological agent of white piedra

a) *Trichosporon beigeli* b) *Exophiala werneckii* c) *Piedraia hortae* d) *Trichophyton rubrum*

11) *Phlebotomus* are the only known vector of

a) *Trypanosomes* b) *Borrelia* c) *Leishmania* d) *Plasmodium*

12) A fungal disease which was first observed in Madurai district of South India

a) Sporotrichosis b) Pityriasis versicolor c) Chromoblastomycosis d) Mycetoma

.....

13) *Fonsecaea* is one of the causative fungi present in the lesions of

a) Mycetoma b) Chromoblastomycosis c) Sporotrichosis d) Dermatophytosis

14) The test performed to differentiate *Trichophyton rubrum* and *T. mentagrophytes*

a) Germ tube test b) Hair bait technique c) Hair perforation test d) Hair brush sampling technique

15) Which of the following is a mechanical carrier?

a) *Anopheles* b) *Musca domestica* c) *Glossina palpalis* d) *Phlebotomus*

16) A lipophilic fungus found in the areas of body rich in sebaceous glands

a) *Exophiala wernecki* b) *Trichosporon beigeli* c) *Trichophyton rubrum* d) *Malassezia furfur*

.....

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

- 17) What are muriform cells?
- 18) Splendore Hoeseppli phenomenon
- 19) Name 4 histopathologic stains
- 20) Name an encapsulated yeast and the test used for its identification
- 21) What are the distinguishing features of the larva of *Anopheles* & *Culex*
- 22) Reynolds-Braude phenomenon
- 23) Dimorphic fungi
- 24) What is myiasis?

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Write a brief account on the wet mount examination of fungal specimens
26. Explain in details the mosquito borne disease
27. Explain slide culture technique
28. Distinguish between black piedra and white piedra
29. Life cycle of *Musca domestica*
30. Explain the general characters of Sporotrichosis

**PART D (Any 2)**

(Essay type. Weightage 4 each)

Board of Studies in Zoology (UG) Mahatma Gandhi University,  
Kottayam

31. Write a short note on the etiology ,pathogenesis and laboratory diagnosis of superficial mycoses.

32. Discuss the public health importance of arthropods with examples.

33.Explain the life cycle and public health importance of Tsetse fly.

.....

**MAHATMA GANDHI UNIVERSITY**  
**FOURTH SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME) EXAMINATION**  
 ... (Year) ZM4V07U. Vocational subject: Medical Microbiology.

**Course 7- MEDICAL BACTERIOLOGY AND VIROLOGY** (course code & course title).

**Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. The selective medium for *Neisseria gonorrhoeae*
  - a. chocolate agar
  - b. Muller Hinton agar
  - c. Thayer-Martin medium
  - d. Blood agar
  
2. The bacilli showing Chinese letter or cuneiform arrangement
  - a. *Klebsiella pneumoniae*
  - b. *Bordetella pertusis*
  - c. *Corynebacterium diphtheriae*
  - d. *Shigella*
  
3. A gram positive lanceolate diplococcus
  - a. *Staphylococcus aureus*
  - b. *Streptococcus pyogenes*
  - c. *Streptococcus pneumoniae*
  - d. *Clostridium tetani*
  
4. Epidemic typhus is caused by
  - a. *Rickettsia mooseri*
  - b. *R. prowazekii*
  - c. *R. akari*
  - d. *R. rickettsii*
  
- .....
5. Rabies virus comes under the genera



- a. *Staphylococcus aureus* b. *Streptococcus pyogenes*  
 c. *Pseudomonas aeruginosa* d. *Bacillus anthracis*
- 

**PART B (Any 5)**

**(Short answer question. Weightage 1 each)**

17. What is significant bacteriuria
18. Name any 2 transport medium for vibrio
19. Short note on Mycoplasma
20. What is MMR vaccine ?
21. Name any 2 pigments of *Pseudomonas aeruginosa*
22. Brief account on Chikungunya virus
23. What is 'Psittacosis-lymphogranuloma-trachoma'?
24. Diagrammatic representation of Influenza virus.

**PART C (Any 4)**

**(Short essay/problem solving type. Weightage 2 each)**

25. Classification of of Shigella
26. Write short note on any 2 diarrheagenic E.coli
27. Write an account on Anthrax
28. Explain the in vitro testing for toxigenicity of diphtheria Bacillus.
29. Write a short note on C-reactive protein
30. Explain the toxins and virulence factors of *Streptococcus pyogenes*.

**PART D (Any 2)**

**(Essay type. Weightage 4 each)**

31. Explain the pathogenesis and prophylaxis of Rhabdo virus.
  32. Morphology, Antigenic structure and pathogenesis of genus Rickettsia
  33. Discuss about the viral oncogenes and important oncogenic DNA viruses.
-

**MAHATMA GANDHI UNIVERSITY**  
**FOURTH SEMESTER B.Sc ZOOLOGY MODEL II (PROGRAMME)**  
**EXAMINATION ... (Year) ZM4V08U. Vocational subject: Medical**  
**Microbiology. Course 8- CLINICAL MICROBIOLOGY (course code & course**  
**title). Total weightage: 25**

Instructions:

1. Time allotted for the examination is 3 Hours
2. Answer **all** questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch, Grade A will be awarded if all the four answers are correct, B for 3, C for 2, D for 1, and E for 0.  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.
3. Candidates can use ..... (Type of calculator/tables).

Time:3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 each for a bunch of four)**

1. Etiological agent of Chancroid
 

|  |   |
|--|---|
| <ol style="list-style-type: none"> <li>a. <i>Trichomonas vaginalis</i></li> <li>c. <i>Chlamydia trachomatis</i></li> </ol> | <ol style="list-style-type: none"> <li>b. <i>Haemophilus ducreyi</i></li> <li>d. <i>Candida albicans</i></li> </ol> |
|--|---|
  2. Traveller's diarrhea is caused by
 

|  |  |
|--|--|
| <ol style="list-style-type: none"> <li>a. <i>Enteropathogenic E.coli</i></li> <li>c. <i>Enteroinvasive E.coli</i></li> </ol> | <ol style="list-style-type: none"> <li>b. <i>Enteropathogenic E.coli</i></li> <li>d. <i>Enteroggregative E.coli</i></li> </ol> |
|--|--|
  3. Oral thrush in neonates is caused predominantly by
 

|  |   |
|--|---|
| <ol style="list-style-type: none"> <li>a. <i>Aspergillus niger</i></li> <li>c. <i>Rhizopus stolonifer</i></li> </ol> | <ol style="list-style-type: none"> <li>b. <i>Penicillium notatum</i></li> <li>d. <i>Candida albicans</i></li> </ol> |
|--|---|
  4. Botulinum toxin is an example for
 

|  |  |
|--|--|
| <ol style="list-style-type: none"> <li>a. Cytotoxin</li> <li>c. Enterotoxin</li> </ol> | <ol style="list-style-type: none"> <li>b. leucotoxin</li> <li>d. neurotoxin</li> </ol> |
|--|--|
- .....
5. In normal bacterial flora one type constitute a constant population and when disturbed it re establishes itself is called
 

|   |   |
|---|---|
| <ol style="list-style-type: none"> <li>a. Transient flora</li> <li>c. occasional flora</li> </ol> | <ol style="list-style-type: none"> <li>b. resident flora</li> <li>d. opportunistic flora</li> </ol> |
|---|---|
  6. Lymphogranuloma venereum is caused by
 

|  |   |
|--|---|
| <ol style="list-style-type: none"> <li>a. <i>Haemophilus ducreyi</i></li> <li>c. <i>Sarcoptes scabiei</i></li> </ol> | <ol style="list-style-type: none"> <li>b. <i>Chlamydia trachomatis</i></li> <li>d. <i>Treponema pallidum</i></li> </ol> |
|--|---|



**PART B (Any 5)****(Short answer question. Weightage 1 each)**

17. What is glomerulonephritis ? Give 2 examples for nephritogenic serotypes.
18. What is Croup? Name the causative agents
19. Give example for 2 bacterial food poisoning toxins.
20. Define Bacteriuria
21. What is VDRL test ?
22. Name any 2 drugs inhibiting synthesis of nucleic acid.
23. Mode of action of Pencillin
24. Beneficial role of normal flora

**PART C (Any 4)****(Short essay/problem solving type. Weightage 2 each)**

25. Write short notes on specimen collection and handling
26. Lab diagnosis and treatment of syphilis.
27. Short notes on pathogenesis and clinical features of Gonorrhoea.
28. What is thrush?
29. What is vincent's angina?
30. Give an example of a virus causing respiratory tract infections.

**PART D (Any 2)****(Essay type. Weightage 4 each)**

31. Write a brief account on the urinary tract infections.
  32. Briefly explain the general procedures in the laboratory diagnosis of infectious diseases.
  33. Write an account on gastrointestinal tract infections.
- .....

**THEORY MODEL QUESTION DOUBLE CORE INDUSTRIAL  
MICROBIOLOGY ZOOLOGY**

**MAHATHMA GANDHI UNIVERSITY**  
**FIRST SEMESTER B.Sc. INDUSTRIAL MICROBIOLOGY AND**  
**ZOOLOGY (PROGRAMME) EXAMINATION..... (YEAR)**

**IMZ 1 B 01U – FUNDAMENTALS OF MICROBIOLOGY**  
**Total weightage: 25**

**Instructions:**

1. Time allotted for the Examination is 3Hours
2. Answer all questions in part A . This contains 4 bunches of 4 objective type Questions. For each bunch ,Grade A will be awarded if all the 4 answers are Correct, B for 3,C for 2,D for 1,and E for 0 .  
 Answer Any 5 questions from part B, any 4 from part C and any 2 from part D.

Time : 3hrs

Model question paper

Part A (Objective type. Weightage 1 for each bunch of four)

1. The scientist who suggested the use of agar as a solidifying material for microbiological media.
  - a. Walter Reed
  - b. Robert Koch
  - c. Paul Ehrlich
  - d. Fanny Hesse
2. Thick walled spores of Fungi transformed from cells of vegetative hyphae are
  - a. Sporangiospores
  - b. Chlamyospores
  - c. Blastospores
  - d. Arthrospores
3. Which of the following antibiotic is not effective to Mycoplasma
  - a. Tetracyclin
  - b. Penicillin
  - c. Chloramphenicol
  - d. Streptomycin
4. In photosynthetic bacteria , the pigment bearing structures are
  - a. Chloroplast
  - b. Mesosomes

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 Kottayam

- c. Plastids
  - d. Chromatophores
- 

14. Capsomeres in TMV are
- a. Lipids
  - b. Starch platelets
  - c. Protein subunits
  - d. Carbohydrates
15. Moist heat sterilization is done at
- a. 121°C
  - b. 160°C
  - c. 112°C
  - d. 110°C
16. Cyanobacteria are also called
- a. Green algae
  - b. Blue green algae
  - c. Filamentous bacteria
  - d. Brown algae
17. Pili is related with
- a. P factor
  - b. R factor
  - c. H factor
  - d. R factor
- 
18. The cell wall material in Eubacteria is
- a. Murein
  - b. Chitin
  - c. Peptidoglycan
  - d. Cellulose
19. Indian ink is used for staining
- a. Flagella
  - b. Capsule
  - c. Endospore
  - d. Cilia
20. The antibiotic Streptomycin is obtained from
- a. Fungi
  - b. Bacteria
  - c. Cyanobacteria
  - d. Actinomycetes
21. The virus that infect algae
- a. Bacteriophages
  - b. Cyanophages
  - c. Mycophages
  - d. Geminiviruses

22. The Microbiologist who demonstrated that all fermentations are due to the activities of specific yeast and bacteria.
- Koch
  - M. Bigo
  - Pasteur
  - Leeuwenhoek
14. Temperature for flash pasteurization is
- 62°C
  - 71°C
  - 63°C
  - 60°C
15. 16 Sr RNA oligonucleotide similarity is made use in
- Bacterial taxonomy
  - Bacterial identification
  - Bacterial culturing
  - Bacterial transformation
16. A Method for long term preservation of microorganisms,
- Candle jar method
  - Subculturing
  - Lyophilization
  - Refrigeration
- 

#### PART B (Any 5)

(Short answer Question . Weightage 1 each)

- Briefly explain Phagocytosis ?
- Define Enrichment media , Give one example?
- What is Pasteurization ?
- Briefly Explain the structure of *Rhizopus* ?
- What is Nucleocapsid ?
- Explain Protoplast ?
- What is heterocyst?
- Define Sterilization and Disinfection?

#### PART C (Any 4)

(Short essay ,Weightage 2 each)

- Explain the structure of Flagella and , various flagellar arrangements ?
- Describe Koch's Postulates ?
- Explain Pour plate method ?

28. Describe Endospore staining ?
29. Write notes on Sterilization by Irradiation ?
30. Difference between Gram Positive and Gram Negative cell wall ?

PART D (Any 2)

(Essay type. Weightage 4 each)

31. Describe various methods of Sterilization in Microbiology?
32. Explain the structure of a Bacterial cell ?
33. Give a detailed account on Culture preservation Techniques ?

**MAHATHMAGANDHI UNIVERSITY**  
**FIRST SEMESTER B.Sc. INDUSTRIAL MICROBIOLOGY AND**  
**ZOOLOGY (PROGRAMME) EXAMINATION..... (YEAR)**

**IMZ 1 B 02U-BIOSTATISTICS & INSTRUMENTATION**

**Total weightage: 25**

**Instructions:**

1. Time allotted for the Examination is 3Hours
2. Answer all questions in part A . This contains 4 bunches of 4 objective type Questions. For each bunch ,Grade A will be awarded if all the 4 answers are Correct, B for 3,C for 2,D for 1,and E for 0 .  
Answer **Any 5** questions from part B, **any 4** from part C and **any 2** from part D.

Time : 3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 for each bunch of four)**

1. Test for goodness of fit is associated with -----
  - a. Chi - square
  - b. ANOVA
  - c. T test
  - d. F test
  
2. The different components in a mixture with different size, shape and density can be separated by.....
  - a. Colorimeter
  - b. Differential Centrifugation
  - c. Electrophoresis
  - d. Chromatography
  
3. Which of the following is used to examine unstained microorganisms suspended in fluid wet mount

- a. Bright field Microscopy
- b. Light microscopy
- c. Dark field microscopy
- d. Flourescent microscopy

4. TLC is a ----- type of chromatography

- a. Liquid-solid
  - b. Gas - liquid
  - c. Liquid-liquid
  - d. Gas-gas
- 

5. The arithmetic mean of the following data 67,69,66,68,72,63,76,65,70,74

- a. 690
- b. 69
- c. 70
- d. 80

6. Which of the following is used for the separation of the proteins

- a. Electrophoresis
- b. Colorimeter
- c. Autoclave
- d. HEPA filters

7. The adsorbent used in column chromatography

- a. Charcoal
- b. Polyacrylamide
- c. Butanol
- d. Acetone

8. Which of the following is not a part of compound light microscope

- a. Ocular lens
  - b. Electromagnetic coils
  - c. Objective lens
  - d. Condensor
- 

-----

9. Which of the following is based on the fact that light is scattered at boundaries between regions having different refractive indices?
- Dark field microscopy
  - Phase contrast microscopy
  - Electron microscopy
  - Light microscopy
10. Which of the following is a filtration apparatus?
- Autoclave
  - Hot air oven
  - Incubator
  - Laminar air flow
11. Find out the mode from the following data 2,4,4,6,5,3,2,2,1,4,2,6,2
- 4
  - 5
  - 2
  - 3
12. Which of the following is a discrete variable
- Height of students
  - Weight of students
  - Marks in examination
  - None of the above
- 
- 
13. Unstained living cells can be observed through
- Flourescence microscope
  - Dark field microscope
  - Phase Contrast Microscope
  - Light microscope
14. Sedimentation Coefficient of biological molecules are expressed as
- Daltons
  - Micrograms
  - Millilitre
  - Svedberg unit
15. At isoelectric point pH is
- Neutral
  - Acidic
  - Alkaline
  - None of the above

16. The complete sterilization happens at
- 101 degrees Celsius & 20 lbs
  - 121 degree Celsius & 15 lbs
  - 141 degree Celsius & 10 lbs
  - 160 degree Celsius & 20 lbs
- 

### **PART B (Any 5)**

(Short answer Question. Weightage 1 each)

#### **Define**

17. Probability
18. Autoclave
19. Electrofocussing
20. Micrometry
21. Seitz filter
22. Poisson distribution
23. List the Merits & Demerits of Median
24. Principle involved in Camera Lucida

### **PART C (Any 4)**

(Short essay, Weightage 2 each)

25. Explain the principle, and working of Laminar air flow
26. Write short notes on Different types of Centrifuges
27. ANOVA
28. Write the use and principle of Fluorescence Microscopy
29. Chi-Square test & its applications
30. Specimen preparation for electron microscopy

### **PART D (Any 2)**

(Essay type. Weightage 4 each)

31. Write an essay on different types of filtration apparatus  
32. Calculate the median and mode of the following data

| <b>Value</b> | <b>Frequency</b> |
|--------------|------------------|
| <b>10</b>    | <b>4</b>         |
| <b>20</b>    | <b>16</b>        |
| <b>30</b>    | <b>40</b>        |
| <b>40</b>    | <b>76</b>        |
| <b>50</b>    | <b>96</b>        |
| <b>60</b>    | <b>112</b>       |
| <b>70</b>    | <b>120</b>       |
| <b>80</b>    | <b>125</b>       |

33. Explain the basic principle and usage of electron microscope

**MAHATHMAGANDHI UNIVERSITY**  
**SECOND SEMESTER B.Sc. INDUSTRIAL MICROBIOLOGY AND**  
**ZOOLOGY (PROGRAMME) EXAMINATION..... (YEAR)**

Board of Studies in Zoology (UG) Mahatma Gandhi University,  
Kottayam

## IMZ 2 B 03 U-MICROBIAL PHYSIOLOGY

**Total weightage: 25**

### **Instructions:**

1. Time allotted for the Examination is 3Hours
2. Answer all questions in part A . This contains 4 bunches of 4 objective type Questions. For each bunch ,Grade A will be awarded if all the 4 answers are Correct, B for 3,C for 2,D for 1,and E for 0 .  
Answer **Any 5** questions from part B, **any 4** from part C and **any 2** from part D.

Time : 3hrs

### **Model question paper**

#### **Part A (Objective type. Weightage 1 for each bunch of four)**

1. In Entner-doudoroff pathway each glucose molecule forms
  - a. 2 ATP and NADPH
  - b. 2 ATP and 2 NADPH
  - c. 2 NADPH and 1ATP
  - d. 1 ATP and 1 NADPH
2. Organisms which obtain energy by oxidizing inorganic compounds are
  - a. Chemoautotrophs
  - b. Heterotrophs
  - c. Mixotrophs
  - d. Chemoorganotrophs
3. In Photosynthesis bacterial chlorophylls serves as
  - a. Electron donors only
  - b. Both electron donor and electron accepters
  - c. Electron acceptors only
  - d. None of the above
4. Fastidious organisms are
  - a. Organisms which are nutritionally exacting
  - b. Organisms which can grow in high salt concentration
  - c. Organisms which are fast growing
  - d. Organisms with generation time less than 20 minutes

---

5. Sulfur bacteria is
  - a. *Rhizobium*
  - b. *Thiobacillus*
  - c. *Bacillus*
  - d. *Rhodospirillum*
6. The enzyme required for the biological conversion of atmospheric nitrogen to ammonia
  - a. Nitrogenase
  - b. Pyruvate dehydrogenase
  - c. Nitrogen synthatase
  - d. Aconitase
7. Anaerobic dissimilation of glucose to pyruvic acid is called

- a. Kreb's cycle
  - b. Gluconeogenesis
  - c. Glycolysis
  - d. Glycogenesis
8. Which of the following do not require metabolic energy
- a. Group translocation
  - b. Active transport
  - c. Passive diffusion
  - d. None of the above
- 
9. Kreb's cycle occurs in
- a. Cytochrome
  - b. Ribosome
  - c. Mesosome
  - d. Mitochondria
10. Psychrophiles are able to grow at
- a. 0°C
  - b. 25°C- 35°C
  - c. 35°C-45°C
  - d. 45°C-55°C
11. Penicillin acts by
- a. Inhibiting Protein synthesis
  - b. Inhibiting Nucleic acid synthesis
  - c. Inhibiting Cell wall synthesis
  - d. None of the above
12. Bacteria which require NaCl for optimum growth are
- a. Halophiles
  - b. Osmophiles
  - c. Psychrophiles
  - d. Xerophiles
- 
13. The antibiotic Streptomycin is obtained from
- a. Fungi
  - b. Cyanobacteria
  - c. Algae
  - d. Actinomycetes
14. E.coli transport lactose by
- a. Facilitated diffusion
  - b. Active transport
  - c. PEP system
  - d. Group translocation
15. The scientist who isolated and cultured bacteria from root nodules
- a. Beijerinck
  - b. Malpighi
  - c. Winogradsky
  - d. Petri
16. Stem nodulating bacteria is
- a. *Bradyrhizobium*
  - b. *Azorhizobium*
  - c. *Rhizobium*
  - d. *Azospirillum*
-

**PART B (Any 5)**

(Short answer Question . Weightage 1 each)

17. Briefly explain passive diffusion
18. Describe ammonification
19. Fermentation
20. Gluconeogenesis
21. Associative nitrogen fixation
22. Describe Transamination
23. Explain symport
24. Write a note on SPC

**PART C (Any 4)**

(Short essay ,Weightage 2 each)

25. Explain cyclic and non- cyclic photophosphorylation?
26. Give an account on nutritional types of bacteria ?
27. Explain the need of nitrogen, phosphorus and sulfur in Bacterial growth?
28. Describe Chemostat and turbidostat?
29. Describe the effect of temperature in microbial growth?
30. Explain bacteriochlorophylls?

**PART D (Any 2)**

(Essay type. Weightage 4 each)

31. Describe ATP generating pathways in microbes?
32. Write an essay on nitrogen fixation in bacteria?
33. Write an account on various counting methods of bacteria?

**MAHATHMAGANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc. INDUSTRIAL MICROBIOLOGY AND**  
**ZOOLOGY (PROGRAMME) EXAMINATION..... (YEAR)**

**IMZ 3 B 04 U-MEDICAL MICROBIOLOGY & VIROLOGY**

**Total weightage: 25**

**Instructions:**

1. Time allotted for the Examination is 3Hours
2. Answer all questions in part A . This contains 4 bunches of 4 objective type Questions. For each bunch ,Grade A will be awarded if all the 4 answers are Correct, B for 3, C for 2,D for 1,and E for 0 .  
Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.

Time : 3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 for each bunch of four)**

1. Name the organism that produce golden yellow pigment
    - a. *Steptococcus pyogenes*
    - b. *Staphylococcus aureus*
    - c. *E.coli*
    - d. *Pseudomonas aeruginosa*
  2. The first pathogenic bacteria to be observed under microscope
    - a. *Bacillus anthracis*
    - b. *Shigella*
    - c. *Klebsiella pneumoniae*
    - d. *Rhabdo virus*
  - 3 An organism that shows IMViC results as - - + +
    - a. *Klebsiella*
    - b. *E.coli*
    - c. *Pseudomonas*
    - d. *Shigella*
  4. A selective media for *vibrio cholerae*
    - a. MSA
    - b. HEA
    - c. XLD
    - d. TCBS
- 
5. A pigment produced by *Pseudomonas aeruginosa*
    - a. Pyocyanin
    - b. Fluorescin
    - c. Pyorubin
    - d. All the above

6. Amidase test is a biochemical test for the identification of
    - a. Pneumonia
    - b. Cholera
    - c. Syphilis
    - d. Tuberculosis
  7. Causative agent of endemic syphilis
    - a. *Trypanema pallidum*
    - b. *Rubella*
    - c. *Salmonella*
    - d. *Borrelia*
  8. A causative agent of human actinomycosis
    - a. *Actinomyces israelii*
    - b. *Actinomyces bovis*
    - c. *Streptomyces*
    - d. *Bifido bacterium*
- 
9. A virus that shows hemagglutination property
    - a. Herpes virus
    - b. Hepatitis virus
    - c. Influenza virus
    - d. Arbo virus
  10. A virus that affects parotid gland
    - a. Mumps virus
    - b. HIV
    - c. Polio virus
    - d. Rubella virus
  11. Bullet shaped virus is
    - a. Polio
    - b. Hepatitis
    - c. HIV
    - d. Rhabdo virus
  12. Name an oncogenic RNA virus
    - a. Adeno virus
    - b. Retro virus
    - c. Pox virus
    - d. Papavo virus
- 
13. A virus with RNA dependent DNA Polymerase enzyme is
    - a. Parvo virus
    - b. Mumps virus
    - c. Herpes virus
    - d. Retro virus
  14. A non motile bacteria
    - a. *E.coli*
    - b. *Shigella*
    - c. *vibrio*
    - d. *Proteus*
  15. An indicator organism for water analysis
    - a. *Klebsiella pneumoniae*
    - b. *Vibrio cholerae*

- c. *E.coli*
- d. *Shigella*

16. Infection acquired from hospitals
    - a. UTI
    - b. Respiratory tract infections
    - c. Nosocomial
    - d. Genital Tract infections
- 

### PART B (Any 5)

(Short answer Question . Weightage 1 each)

17. Write a short note on Cell Surface proteins present in *Staphylococcus aureus*
18. What are the cultural characteristics of *Streptococcus pyogenes*
19. Describe briefly about Laboratory diagnosis of *Bacillus anthracis*
20. Briefly describe the structure of hepatitis B virus
21. Explain about Nosocomial infections
22. Write a note on lab diagnosis of arbo virus
23. Explain the method of specimen collection for the identification of mumps virus
24. Describe briefly about the tests for the diagnosis of Tuberculosis

### PART C (Any 4)

(Short essay ,Weightage 2 each)

25. Write an account on cultivation of *vibrio cholerae*
26. Explain about upper respiratory infections
27. Describe briefly about normal flora of human body
28. Write a note on Actinomycosis and its lab diagnosis
29. Describe structural features of HIV with a neat diagram
30. Explain about influenza virus

### PART D (Any 2)

(Essay type. Weightage 4 each)

31. Write a detailed account on *E.coli*
32. Write on Epidemiology, Symptomatology, diagnosis and treatment of tuberculosis
33. Explain about Urinary tract infections

**MAHATHMAGANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc. INDUSTRIAL MICROBIOLOGY AND**  
**ZOOLOGY (PROGRAMME) EXAMINATION..... (YEAR)**

**IMZ 3 B 05 U – MOLECULAR BIOLOGY AND MICROBIAL**  
**BIOTECHNOLOGY**

**Total weightage: 25**

**Instructions:**

1. Time allotted for the Examination is 3Hours
2. Answer all questions in part A . This contains 4 bunches of 4 objective type Questions. For each bunch ,Grade A will be awarded if all the 4 answers are Correct, B for 3,C for 2,D for 1,and E for 0 .  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.

Time : 3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 for each bunch of four)**

1. All the mRNAs have a ----- tail
  - a. poly A
  - b. Poly G
  - c. Poly U
  - d. Poly C
2. An example of branched chain amino acid
  - a. Lysine
  - b. Glycine
  - c. Tyrosine
  - d. Valine
3. The DNA finger printing was discovered by
  - a. Allec Jeffry
  - b. Francis Galton
  - c. T.H. Morgan
  - d. Karry Mullis
4. Shuttle vectors are
  - a. Vectors that include replication system derived from one host species
  - b. Vectors that does not include replication system
  - c. Vectors with many restriction sites
  - d. Vectors that include replication system from more than one host specie

- 
5. Which of the following is a nucleoprotein
- Histones
  - Chromatin
  - Keratin
  - Creatine
6. The synthesis of protein using an RNA template is called
- Translation
  - Replication
  - Transcription
  - Transformation
7. An example of an aromatic amino acid
- Proline
  - Alanine
  - Phenylalanine
  - Histidine
8. Any change that occurs in the third position of the codon is called
- Reverse mutation
  - Silent mutation
  - Point mutation
  - Missense mutation
- 
9. All tRNAs have -----bases at the 3' end
- GGC
  - UAA
  - CCA
  - UUC
10.  $\beta$  Lactam antibiotics include
- Penicillin and its relatives
  - Tetracyclines
  - Aminoglycosides
  - All the above
11. Conjugation is
- Transfer of genetic material by direct contact
  - Uptake of genetic material from the surrounding environment
  - Transfer of genetic material by viruses
  - Uptake of naked DNA
12. 5' GAATTC 3' is the recognition sequence of
- EcoRI
  - BamHI
  - AluI
  - Hae III
- 
13. Which base is not found in DNA
- Thymine

- c. Adenine
  - d. Uracil
  - e. Guanine
14. Transformation was discovered by
- f. Joshua Lederberg
  - g. Norton zinder
  - h. Fred Griffith
  - i. Maxam
15. The Protein part of the Enzyme is called
- j. Holoenzyme
  - k. Prosthetic group
  - l. Apoenzyme
  - m. Cofactor
16. A chemical or a physical agent that cause mutation is called
- n. Mutent
  - o. Muton
  - p. Mutagen
  - q. None of the above
- 

**PART B (Any 5)**

(Short answer Question . Weightage 1 each)

- 17. What are Plasmids?
- 18. Briefly explain Semi conservative Replication ?
- 19. Describe the Structure of Adenine?
- 20. Define Auxotroph and Prototroph?
- 21. Describe codon?
- 22. What are Restriction enzymes?
- 23. Describe the forces that stabilize double stranded DNA?
- 24. Explain Transition and Transversion.

**PART C (Any 4)**

(Short essay ,Weightage 2 each)

- 25. Briefly explain DNA Fingerprinting and its practical applications.
  - 26. Describe how transformation occurs in *S. pneumoniae* ?
  - 27. Describe Replica plate Technique?
  - 28. Explain PCR Technique?
  - 29. Explain the rolling circle mode of DNA replication?
  - 30. Describe the steps involved in the isolation of chromosomal DNA?

**PART D (Any 2)**

(Essay type. Weightage 4 each)

31. Explain various steps involved in the replication of DNA ?
32. Describe Vectors and their functions ?
33. What is Mutation ? Give examples of physical and chemical mutagens.  
Explain the terms point mutation, Silent mutation, and Missence mutation ?

**MAHATHMAGANDHI UNIVERSITY**  
**THIRD SEMESTER B.Sc. INDUSTRIAL MICROBIOLOGY AND**  
**ZOOLOGY (PROGRAMME) EXAMINATION..... (YEAR)**

**IMZ 3 B 06 U – BASICS OF INDUSTRIAL MICROBIOLOGY**

**Total weightage: 25**

**Instructions:**

1. Time allotted for the Examination is 3Hours
2. Answer all questions in part A . This contains 4 bunches of 4 objective type Questions. For each bunch ,Grade A will be awarded if all the 4 answers are Correct, B for 3,C for 2,D for 1,and E for 0 .  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D

Time : 3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 for each bunch of four)**

1. Air is sterilized by
  - a. Autoclaving
  - b. Membrane filter
  - c. UV light
  - d. Hot Air Oven
2. Crowded plate technique is used for the screening of strains producing
  - a. Amino acids
  - b. Antibiotics
  - c. Organic acids
  - d. Vitamins
3. The term cell was proposed by
  - a. Fabri
  - b. Galileo
  - c. Robert Hook
  - d. Robert Koch
4. Identify the steroid among the group
  - a. Riboflavin
  - b. L- Sorbose
  - c. L-Lysine
  - d. Cortisone
5. The mechanism used to improve microorganisms to produce new products
  - a. Tissue culture

- b. r DNA technology
  - c. Continuous culture
  - d. Batch culture
6. In alcohol fermentation Yeast fermented sugar into
- a. Oxalic acid
  - b. Carbonic acid
  - c. Sulfuric acid
  - d. Hydrochloric acid
7. Technique developed for assaying products like antibiotics and vitamins
- a. Analytical chemistry
  - b. Colorimetry
  - c. Turbidometry
  - d. Analytical microbiology
8. Free flowing water is absent in
- a. Submerged fermentation
  - b. Surface fermentation
  - c. Solid state fermentation
  - d. Biphasic fermentation

---

9. Replica plating is used to detect

- a. Heterotrophs
- b. Mixotrophs
- c. Auxotrophs
- d. Phototrophs

10. A cryoprotective agent

- a. Methanol
- b. Ethanol
- c. Dimethyl sulphoxide
- d. Glycine

11. Name an inert antifoam agent

- a. Soyabean oil
- b. Silicons
- c. Corn oil
- d. None of the above

12. Thickness of the bed in packed bed fermentor

- a. 1.5 m
- b. 15 cm
- c. 1.2 m
- d. 1.5 cm

---

13. Inoculum size commonly used during fermentation

- a. 5-10%
- b. 10-15%
- c. 15-20%
- d. 20-25%

14. Mechanical stirrers are used in

- a. Non –agitated fermentors
  - b. Air- lift fermentors
  - c. Stirred tank fermentor
  - d. Tubular fermentor
15. Penicillin was discovered in
- a. 1921
  - b. 1928
  - c. 1929
  - d. 1932
16. The most suitable method of long term preservation of microbes
- a. Serial subculturing
  - b. Overlaying culture with mineral oil
  - c. Lyophilization
  - d. Nitrogen storage
- 

### **PART B (Any 5)**

(Short answer Question . Weightage 1 each)

- 17. Describe CSTF ?
- 18. Explain preservation of microbes by Lyophilization ?
- 19. Briefly describe Crowded plate technique ?
- 20. Explain the scope of industrial microbiology ?
- 21. Describe liquid –liquid extraction ?
- 22. Describe the steps involved inoculum preparation ?
- 23. What is meant by “Pasteur Effect” ?
- 24. Explain enrichment culture technique ?

### **PART C (Any 4)**

(Short essay ,Weightage 2 each)

- 25. Explain Batch fermentation?
- 26. Discuss on the various raw materials used in industry?
- 27. Explain Continuous fermentation?
- 28. Explain the various carbon sources used in fermentation industry?
- 29. Mention the structure of a typical fermentor?
- 30. Explain the techniques used for screening of microbes for antibiotic production?

### **PART D (Any 2)**

(Essay type. Weightage 4 each)

- 31. Describe the methods of separation and purification of industrial products?
- 32. Write an essay on the history and development of Industrial microbiology?
- 33. Explain the common sterilization techniques?

**MAHATHMAGANDHI UNIVERSITY**  
**FOURTH SEMESTER B.Sc. INDUSTRIAL MICROBIOLOGY AND**  
**ZOOLOGY (PROGRAMME) EXAMINATION..... (YEAR)**

**IMZ 4 B 07U –FERMENTATION TECHNOLOGY**

**Total weightage: 25**

**Instructions:**

1. Time allotted for the Examination is 3Hours
2. Answer all questions in part A . This contains 4 bunches of 4 objective type Questions. For each bunch ,Grade A will be awarded if all the 4 answers are Correct, B for 3,C for 2,D for 1,and E for 0 .  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D

Time : 3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 for each bunch of four)**

- 1 Beta lactam ring is present in
  - a. Penicillin
  - b. Streptomycin
  - c. tetracyclin
  - d. chloramphenicol
2. *Kluveromyces fragilis* is
  - a. bacteria
  - b. Fungi
  - c. actinomycetes
  - d. protozoa
- 3 . The pasteurization of milk is achieved by heating at
  - a. 62.8 c
  - b. 75.3c
  - c. 55.2c
  - d. 87.5c
- 4 Acetic acid producing micro organism is
  - a. *Acetobacter spp.*
  - b. *Aspergillus spp.*,
  - c. *Clostridium spp*
  - d., *Bacillus spp.*

- 
- 5 Precursor of vitamin B12 production  
a.cadium  
b.cobalt  
c.calcium  
d.magnesium
6. A raw material used for lactic acid production  
a. whey  
b. beef extract  
c. Peptone  
d. yeast extract
- 7 Microbe used for bioleaching of ore  
a.*Spherotilus natans*  
b.*Thiobacillus ferroxidans*  
c.*Desulphovibrio desullphuricans*  
d.*Pyricularia oryzae*
- 8 An amino glycosidic antibiotic  
a.penicillin  
b.streptomycin  
c tetracyclin  
d.ciprofloxacin
- 
9. Lysine is produced by a mutant of  
a.*corynebacterium glutamicum*  
b. *Aspergillus niger*  
c.*Ashbya gossypii*  
d. *Torulopsis utilis*
- 10 A source of alkaline protease  
a.*Aspergillus niger*  
b. *Bacillus cereus*  
c. *Bacillus subtilis*  
d. *Pseudomonas fragilis*)
- 11 Precursor of pencillin production  
a.Phenyl acetic acid  
b.Lactose  
c.Magnesium sulphate.  
d.Sucrose
- 12 Optimum temperature for the production of Cyanocobalamine  
a.80° C  
b.80° F  
c.60° C  
d.60° F
- 13 An antifungal antibiotic  
a.Pencillin  
b.Streptomycin  
c.Griseofulvin

- d.Ampicillin
- 14 Name an antibiotic obtain from an actinomycete
- Pencillin
  - Chloramphenicol
  - Streptomycin
  - Cephalosporin
- 15 Example for dual fermentation
- Pencillin production
  - Riboflavin production
  - Acetic acid production
  - Lactic acid production
16. Wetting agent used in the preparation of spore suspension
- Sodium Laurylsulphonate
  - Sodium sulphate
  - Lye
  - Pottasium carbonate

**PART B (Any 5)**

(Short answer Question . Weightage 1 each)

- What are the applications of amylases in industries
- Discuss inoculum development for production of glycerol.
- What is biotransformation . Give an example
- Describe the role of precursors in penicillin production
- Production of peptidase
- Explain surface fermentation
- Explain the recovery process of citric acid production
- Explain the solvent recovery in ethanol fermentation

**PART C (Any 4)**

(Short essay ,Weightage 2 each )

- Explain the production of Streptomycin
- Explain the production of Pencillin
- What is lysine ?. Explain its production by micro organism & its uses.
- Explain the lactic acid production.
- Describe fermentative production of ethanol.
- Explain the industrial production of riboflavin

**PART D (Any 2)**

(Essay type. Weightage 4 each)

- Describe the production of organic acids employing micro organism
- Explain the role of micro organism in oil recovery?
- What is bio -leaching? discuss the roles of microbes in enhanced recovery of metals.

**MAHATHMAGANDHI UNIVERSITY**  
**FOURTH SEMESTER B.Sc. INDUSTRIAL MICROBIOLOGY AND**  
**ZOOLOGY (PROGRAMME) EXAMINATION..... (YEAR)**  
**IMZ 4 B 08 U –AGRICULTURAL MICROBIOLOGY &**  
**BIOFERTILIZERS**

**Total weightage: 25**

**Instructions:**

1. Time allotted for the Examination is 3Hours
2. Answer all questions in part A . This contains 4 bunches of 4 objective type Questions. For each bunch ,Grade A will be awarded if all the 4 answers are Correct, B for 3,C for 2,D for 1,and E for 0 .  
 Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D

Time : 3hrs

**Model question paper**

**Part A** (Objective type. Weightage 1 for each bunch of four)

1. Most of the insecticidal activity of *Bacillus thuringensis* is due to
    - a. endotoxin
    - b. exotoxin
    - c. endospore
    - d. exospore
  2. The fungi causing Tikka disease of ground nut
    - a. *Cercospora personata*
    - b. *C. arachidicola*
    - c. *Pyricularia oryzae*
    - d. *Aspergillus niger*
  3. The medium suitable for mass cultivation of Rhizobium
    - a. TCBS
    - b. YEMA
    - c. ZN Medium
    - d. MSA
  - 4 One of the following is a non -symbiotic nitrogen fixing bacteria
    - a. Rhizobium
    - b. Azospirillum
    - c. Mycorrhizae
    - d. none of the above
- 
- 5 The profusely branched intracellular hyphae of root fungus are known as

- a. vesicles
  - b. arbuscules
  - c. haustoria
  - d. appressorium
- 6 Type of mutualistic association involving the exchange of nutrients between two species
- a. mutualism
  - b. commensalisms
  - c. syntropism,
  - d. antagonism
- 7 citrus canker is caused by
- a. *Xanthomonas citri*
  - b. *Psuedomonas*
  - c. *Erwinia*,
  - d. *Aspergillus*
- 8 In the nitrogen cycle nitrite is converted to nitrate by
- a. *Nitrosomonas*
  - b. *Azotobacter*
  - c. *Azospirillum*
  - d. *Nitrobacter*
- 
- 9 VAM help plants to capture
- a. nitrites
  - b. nitrates
  - c. Phosphrous
  - d. sulphur
- 10 The microbial process by which complex organic compounds are converted to simple inorganic compounds
- a. solubilization
  - b. mineralization
  - c. decomposition
  - d. degradation
- 11 The fungal portion in lichen is called
- a. phycobiont
  - b. mycobiont
  - c. Mycorrhizae
  - d. mycelium
- 12 The soil material known as humus is composed primarily of
- a. phosphates & nitrates
  - b. organic matter
  - c. bases
  - d. Inorganic matter
- 
- 13 In cyanobacteria the respiration is
- a. aerobic
  - b. anaerobi

- c. anoxic
  - d. none of the above
- 14 Protozoa survive dry condition by the formation of
- a.cyst
  - b. akinete
  - c. Soredia
  - d. heterocyst
- 15 Example of a parasitic bacteria
- a.*E.coli*
  - b. *Bdellovibrio*
  - c. *Arthrobotrys*
  - d. *Dactylus*
- 16 The microflora on the leaf surface is
- a. phylloplane
  - b. rhizoplane
  - c. Rhizosphere
  - d. syntropism

#### **PART B (Any 5)**

(Short answer Question . Weightage 1 each)

- 17. Write a note on nif genes?
- 18 Define Humus?
- 19 What is Phylloplane?
- 20 Explain Rhizosphere?
- 21 Describe Antagonism?
- 22 What are the symptoms of citrus canker?
- 23 Explain predation?
- 24 Describe Rhizosphere effect?

#### **PART C (Any 4)**

(Short essay ,Weightage 2 each)

- 25 What are the different types of mycorrhizae?
- 26 Explain synergistic interaction .Give an example.
- 27 Describe the nitrogen fixation in photosynthetic & non photosynthetic system
- 28 Explain briefly the nitrogen cycle.
- 29 Describe the production of phosphate solubilization bacteria as biofertilizer
- 30 What are biopesticides ?. Give an example of viral insecticides

#### **PART D (Any 2)**

(Essay type. Weightage 4 each)

- 31 Describe the microbial flora of rhizosphere soil?.
- 32 Write brief notes on different types of microbe-microbe interaction
- 33 Write an essay on symbiotic & non symbiotic nitrogen fixation?

**OPEN COURSE FOR OTHER STREAMS  
MAHATHMA GANDHI UNIVERSITY  
FIFTH SEMESTER  
ZY 5 D 04 U – FOOD MICROBIOLOGY  
Total weightage: 25**

**Instructions:**

1. Time allotted for the Examination is 3Hours
2. Answer all questions in part A . This contains 4 bunches of 4 objective type Questions. For each bunch ,Grade A will be awarded if all the 4 answers are Correct, B for 3,C for 2,D for 1,and E for 0 .  
Answer any 5 questions from part B, any 4 from part C and any 2 from part D.

Time : 3hrs

**Model question paper**

**Part A** (Objective type. Weightage 1 for each bunch of four)

1. Microorganisms grow above 40° C are called
  - a. Psychrophiles
  - b. Osmophiles
  - c. Mesophiles.
  - d. Thermophiles.
2. Example for food poisoning disease.
  - a. Botulism
  - b. Anthrax
  - c. Diphtheria
  - d. Pneumonia.
3. Aflatoxin is produced by
  - a. *Aspergillus*
  - b. *Klebsiella*
  - c. *E.coli*
  - d. *Pencillium*
4. Colicin is a bacteriosin produced by
  - a. *Clostridium botulinum*
  - b. *E.coli*
  - c. *Corynebacterium diphtheriae*

d. *Staphylococcus aureus*.

- 
23. A chemical preservative is
- Propionates
  - Benzoates
  - Woodsmoke
  - All the above
24. A method for the removal of microorganisms from food
- Filtration
  - Packaging
  - Chemical preservation
  - Drying
25. A proper method for asepsis
- Drying
  - Centrifugation
  - Anaerobic condition
  - Packaging
26. Yeast propagated essentially for food purposes is known as
- Fodder Yeast
  - Food Yeast
  - Agricultural Yeast
  - SCP
- 
27. Baker's Yeast is a strain of
- Saccharomyces cerevisiae*
  - Pencillium notatum*
  - Candida utilis*
  - Aspergillus
28. Toxin produced by *Staphylococcus aureus*
- Neurotoxin
  - Enterotoxin
  - Aflatoxin
  - Ochratoxin
29. TA spoilage is caused by
- Clostridium botulinum*
  - Clostridium thermosacharolyticum*
  - Yersinia enterocolitica*
  - Bacillus cereus*
30. Back spot in meat is caused by
- Cladosporium herbarum*
  - Thamnidium elegans*
  - Mucor mucedu*
  - Mucor recemosus*
-

31. Pink mold rot in vegetables is caused by
- Trichothecium roseum*
  - Trichoderma*
  - Pencillium digitatum*
  - Rhizopus stolonifer*
14. Procedure after drying
- Peeling
  - Blanching
  - Sweating
  - Sulphuring
15. A pink or reddish liquid comes from meat on thawing
- Metacryotic liquid
  - Bleeding
  - Leakage
  - Freezerburn
16. Causative agent of Q-Fever
- Coxiella burnetti*
  - Clostridium botulinum*
  - Yersinia enterocolityca*
  - Shigella*
- 

### **PART B (Any 5)**

(Short answer Question . Weightage 1 each)

- Briefly explain about GRAS?
- Asepsis.
- Treatment of food before and after drying ?
- Water activity .
- Industrially important molds?
- Spoilage of fruits and vegetables ?
- Heat treatments employed in the processing food?
- Preservation of milk?

### **PART C (Any 4)**

(Short essay ,Weightage 2 each)

- Explain about canning ?
- Describe single cell protein ?
- Explain general types of spoilage of meat and meat products ?
- Describe HACCP ?
- Write notes on fermented diary products ?
- Microbiological criteria for food ?

**PART D (Any 2)**

(Essay type. Weightage 4 each)

31. Describe various food additives?
32. Explain bacterial food borne diseases ?
33. Give a detailed account on factors affecting the growth of microorganisms in food ?

**MAHATHMA GANDHI UNIVERSITY  
SIXTH SEMESTER B.Sc. INDUSTRIAL MICROBIOLOGY AND  
ZOOLOGY (PROGRAMME) EXAMINATION..... (YEAR)**

**IMZ 6 B 09 U – MICROBIAL WASTE MANAGEMENT  
Total weightage: 25**

**Instructions:**

1. Time allotted for the Examination is 3Hours
2. Answer all questions in part A . This contains 4 bunches of 4 objective type Questions. For each bunch ,Grade A will be awarded if all the 4 answers are Correct, B for 3,C for 2,D for 1,and E for 0 .  
Answer any 5 questions from part B, any 4 from part C and any 2 from part D.

Time : 3hrs

**Model question paper**

**Part A (Objective type. Weightage 1 for each bunch of four)**

1. Biomethanation produces a gas containing
  - a. Ammonia
  - b. Nitrogen
  - c. Methane
  - d. Oxygen
2. Organic waste can be degraded using
  - a. Vermi composting
  - b. Incineration
  - c. Burning
  - d. Inspisation
3. Urban solid wastes are collectively called
  - a. Garbage
  - b. Sewage
  - c. Municipal soli waste
  - d. City waste
4. One of the following bacterium is associated with waste water
  - a. Nitrobacter
  - b. Neurospora
  - c. Escherichia

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Kottayam

## d. Bacillus

- 
5. BOD indicates
- Inorganic Pollution
  - Industrial Pollution
  - Organic Pollution
  - Chemical Pollution
6. Microbial pollution can be controlled through a technique called
- Bioremediation
  - Composting
  - Biodegradation
  - Filtration
7. The separation of solid suspended particles from sewage is called
- screening
  - Sedimentation
  - Composting
  - Centrifugation
8. A hospital waste is
- Food waste
  - Paper waste
  - Needles and syringes
  - All the above
- 
9. Degradation of organic waste into compost using earthworm
- Vermi composting
  - Microbial composting
  - Natural composting
  - Worm composting
10. The disinfection of sewage water is carried out by the processes of
- Sedimentation
  - Filtration
  - Centrifugation
  - Chlorination
11. A microbial community occurring on the surface as a micro layer is called
- Biocide
  - Biofilm
  - Biogas
  - Bioform
12. Chlorin demand does not depend on
- Organic matter
  - Inorganic matter
  - Number of microorganism
  - All the above
-

13. Biogas production is associated with the bacteria called
- Methanobacterium*
  - Lactobacillus*
  - Aspergillus*
  - Azetobacter*
14. The moisture content of waste during dry fermentation processes between
- 20 and 30 percent
  - 55 and 75 percent
  - 85 and 95 percent
  - 95 and 100 percent
15. Which of the following is a biodegradable pollutant
- DDT
  - Mercuric salt
  - Sewage
  - None of the above
16. The accumulation of pollutants in organisms is called
- BOD
  - Biological magnification
  - COD
  - Pollution
- 

### **PART B (Any 5)**

(Short answer Question . Weightage 1 each)

- Briefly explain about BOD?
- What are super bugs?.
- Worm castings ?
- Septic tanks .
- Bioremediation?
- Activated sludge process?
- Trickling filters?
- Degradation of plastics?

### **PART C (Any 4)**

(Short essay ,Weightage 2 each)

- Explain about hospital waste management ?

26. Describe composting ?
27. Explain disinfection of sewage?
28. Describe oxidation ponds ?
29. Write notes on biosorption ?
30. Biodegradation of leather ?

**PART D (Any 2)**

(Essay type. Weightage 4 each)

31. Describe various methods of waste water treatment?
32. Explain biodegradation of environmental pollutants ?
33. Give a detailed account on categories and sources of solid waste ?

**MAHATHMAGANDHI UNIVERSITY**  
**SIXTH SEMESTER B.Sc. INDUSTRIAL MICROBIOLOGY AND**  
**ZOOLOGY (PROGRAMME) EXAMINATION..... (YEAR)**  
**ZY 6 B 11(a) U-IMMUNOLOGY**

**Total Weightage: 25**

**Instructions:**

1. Time allotted for the Examination is 3Hours
2. Answer all questions in part A. This contains 4 bunches of 4 objective type Questions. For each bunch, Grade A will be awarded if all the 4 answers are Correct, B for 3, C for 2, D for 1, and E for 0.  
Answer **any 5** questions from part B, **any 4** from part C and **any 2** from part D.

Time: 3hrs

**Model question paper**

**Part A** (Objective type. Weightage 1 for each bunch of four)

1. The ability to induce humoral and cell mediated immune response is
  - a. Immunogenicity
  - b. Immunogen
  - c. Antigenicity
  - d. Innate immunity
  
2. Effector B cells are also known as
  - a. Memory cells
  - b. Plasma cells
  - c. Native cell
  - d. Blast cell
  
3. When pentameric Ig M is bound to Ag on a target surface it assume a ----- configuration
  - a. trigonal
  - b. staple
  - c. stable
  - d. opsonin

4. Immunologically active regions of an Immunogen that bind to Ag-specific memory receptors or lymphocytes  
or to secreted Antibodies

- a. Adjuvant
- b. Epitope
- c. Haptens
- d. Agretope

---

5. Ag-binding activity of antibodies is contained within

- a. Fab fragment
- b. Fc fragment
- c. Hinge region
- d. Constant region

6. The only Ig that can pass through placenta

- a. Ig M
- b. Ig G
- c. Ig E
- d. Ig A

7. Secretory Ig A has been shown to provide defense against bacteria such as

- a. *Proteus*
- b. *Shigella*
- c. *Salmonella*
- d. *Pseudomonas*

8. The strength of multiple interactions between a multivalent Ab & Ag is called

- a. Allosteric substrate
- b. Homogenic substrate
- c. Heterogenic substrate
- d. Chromogenic substrate

---

9. The strength of multiple interactions between a multivalent Ab and Ag is called

- e. Affinity
- f. Valency
- g. Avidity

- h. Precipitation
10. Cytokines binding to receptors on a target cell in close proximity to the producer cells
- a. Autocrine
  - b. Paracrine
  - c. Endocrine
  - d. Exocrine
11. Type I hypersensitivity reaction is induced by antigens referred to as
- e. Allergens
  - f. Ig M
  - g. receptors
  - h. Amines
12. In humans, MHC is referred to as
- i. HLA Complex
  - j. H-2 Complex
  - k. HBA Complex
  - l. CDR
- 
13. Tissue transfer between genetically different members of the same species is called
- m. Autograft
  - n. Isograft
  - o. Allograft
  - p. Xenograft
14. Tumour that continues to grow and becomes progressively invasive is called
- q. Malignant
  - r. Benign
  - s. Transformed
  - t. Cyst
15. Production of Antibodies against TSH receptor generates a disease called
- u. Graves disease
  - v. Myasthenia gravis
  - w. Systemic lupus erythematosus
  - x. SCID

16. The most severe syndrome resulting from the complete absence of a thymus

- y. Down Syndrome
  - z. JOB syndrome
  - aa. DiGeorge syndrome
  - bb. Klenifelters syndrome
- 

**PART B (Any 5)**

(Short answer Question. Weightage 1 each)

Define the following

- 17. Phagocytosis
- 18. Haptens
- 19. Innate immunity
- 20. Lymphocytes
- 21. Monoclonal Antibodies
- 22. Autoimmunity
- 23. Tumour antigens
- 24. Immunization

**PART C (Any 4)**

(Short essay, Weightage 2 each)

- 25. Describe Passive immunity
- 26. What are cytokines? Give their functions
- 27. Write short notes on the different types of Antigens.
- 28. Explain Precipitation reaction
- 29. AB Blood group is a Universal recipient. Substantiate this statement Immunohaematologically.
- 30. Explain Type I Hypersensitivity

**PART D (Any 2)**

(Essay type. Weightage 4 each)

- 31. Explain the Immunology of AIDS
- 32. Write a note on the principle and the different types of Vaccines
- 33. Explain the structure and functions of different types of Immunoglobulins.