R1038

Sub. Code
530201

M.Sc. DEGREE EXAMINATION, APRIL – 2024

Second Semester

Microbiology

MOLECULAR BIOLOGY AND MICROBIAL GENETICS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. What happens in hypochromicity? (CO1, K2)
   (a) When DNA is in bound form, there is decrease in absorption of UV light
   (b) When DNA is in bound form, there is increase in absorption of UV light
   (c) When DNA is in unbound form, it is more stable
   (d) When DNA is in unbound form, there is decrease in absorption of UV light

2. Which of the following would contribute towards strand separation during denaturation. (CO1, K2)
   (a) Breaking of hydrogen bond between nitrogenous bases
   (b) Repulsion between phosphate groups
   (c) Weak Van der waals interaction between nitrogenous bases
   (d) High G+C content

3. What is the substitution of a purine base with a pyrimidine base known as? (CO2, K2)

(a) Deletion (b) Transition

(c) Addition (d) Transversion

4. Which of the following properties is improved by site directed mutagenesis? (CO2, K3)

(a) Physical property (b) Chemical property

(c) Kinetic property (d) Integrity

5. Which of the following is NOT a step in mRNA processing? (CO3, K1)

(a) 5' capping (b) Splicing of introns

(c) Polyadenylation (d) RNA silencing

6. Which one of the following rRNA undergoes least post-transcriptional processing? (CO3, K3)

(a) 28S (b) 18S

(c) 5.8S (d) 5S

7. What are molecular chaperones? (CO4, K2)

(a) Enzymes (b) Cell mass

(c) Tumor (d) Helper proteins

8. Which position of a codon is said to wobble? (CO4, K2)

(a) First (b) Second

(c) Third (d) Fourth

9. Which of the following role is performed by a bacteriophage in transduction? (CO5, K3)

(a) Vector (b) Donor

(c) Recipient (d) Episome

10. Specialised transduction is mediated by (CO5, K2)

(a) Temperate bacteriophages

(b) Virulent bacteriophages

(c) Retroviruses

(d) Plasmids

Part B ($5 \times 5 = 25$)

Answer **all** the questions not more than 500 words each.

11. (a) Compare and contrast DNA and RNA. (CO1, K4)

Or

(b) Write short notes on types of plasmids. (CO1, K2)

12. (a) Explain different types of mutation. (CO2, K2)

Or

(b) Describe in brief the procedure to isolate mutants. (CO2, K2)

13. (a) Examine post transcriptional gene regulation in eukaryotes. (CO3, K4)

Or

(b) Explain the transcriptional events in prokaryotes. (CO3, K4)

14. (a) List out the properties of genetic code. (CO4, K1)

Or

(b) Write a brief note on Arabinose operon. (CO4, K2)

15. (a) How does bacterial conjugation help in genetic recombination? (CO5, K3)

Or

(b) Describe bacterial transformation. (CO5, K2)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Elaborate physical and chemical structure of DNA. (CO1, K3)

Or

(b) Describe the types, forms and properties of DNA. (CO1, K3)

17. (a) Evaluate different DNA repair mechanism in prokaryotes. (CO2, K5)

Or

(b) Describe the chemical causes of mutation. (CO2, K2)

18. (a) Write a detailed description of enzymes involved in DNA replication. (CO3, K2)

Or

(b) Explain semi conservative mode of DNA replication. (CO3, K2)

19. (a) Explain how codons in mRNA are translated into protein in prokaryotes. (CO4, K4)

Or

(b) Describe trp operon model of gene regulation. (CO4, K2)

20. (a) Write an essay on holliday model of recombination (CO5, K2)

Or

(b) Describe in detail the generalised and specialised transduction. (CO5, K2)

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R1039

Sub. Code
530202

M.Sc. DEGREE EXAMINATION, APRIL – 2024

Second Semester

Microbiology

rDNA TECHNOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Which of the following enzyme is used to remove phosphate group from 5' end of DNA? (CO1, K2)

   (a) Restriction enzyme

   (b) Polynucleotide kinase

   (c) Alkaline phosphatase

   (d) Ribonuclease H

2. The enzyme that adds mononucleotide triphosphates to the 3' OH group of a DNA fragment is (CO1, K2)

   (a) Polynucleotide kinase

   (b) Terminal nucleotidyl transferase

   (c) Terminal phosphoryl transferase

   (d) Restriction endonuclease

3. Polyadenylation of RNA species is an important criterion for the production of cDNA species. Which of the following holds true? (CO2, K3)

(a) Polyadenylation should be at 3' end

(b) Eukaryotic mRNAs are mostly non-polyadenylated

(c) Bacterial mRNAs and organelle mRNAs are polyadenylated

(d) It is carried out by the addition of T residues after synthesis

4. The term shotgun cloning refers to a method of cloning that involves (CO2, K2)

(a) Amplifying DNA using PCR

(b) Incorporating DNA fragments into plasmid

(c) Ligating DNA fragments into plasmids

(d) Randomly fragmenting DNA and cloning the fragments

5. How many DNA duplexes are obtained from one DNA duplex after four cycles of PCR? (CO3, K3)

(a) 8 (b) 4

(c) 16 (d) 32

6. The enzyme used in Maxam Gilbert method for ^{32}P labelling of the DNA at 3' end is (CO3, K2)

(a) Polynucleotide kinase

(b) Alkaline phosphatase

(c) Exonuclease

(d) Terminal nucleotidyl transferase

7. The mel gene for melanin biosynthesis in E.coli were derived from (CO4, K2)

(a) *Curvularia lunata*

(b) *Rhizobium etli*

(c) *Klebsiella pneumuniae*

(d) *Pseudomonas stutzeri*

8. Which steroid is used in microbial transformation? (CO4, K2)

(a) Cortisol (b) Cholesterol

(c) Testosterone (d) Progesterone

9. Introduction of DNA into cell by exposing to high voltage electric pulse is (CO5, K2)

(a) Electrodiffusion

(b) Microinjection

(c) Microprojectile bombardment

(d) Electroporation

10. Disarming of Ti plasmid is (CO5, K4)

(a) Removal of virulent gene

(b) Removal of 25 base pair repeat

(c) Removal of T-DNA

(d) Removal of host specificity region

Part B ($5 \times 5 = 25$)

Answer **all** the questions not more than 500 words each.

11. (a) What are the elements necessary for gene expression? Differentiate a plasmid vector from expression vector. (CO1, K4)

Or

(b) Compare and contrast type I, II and III restriction endonuclease. (CO1, K3)

12. (a) Explain the functions of linkers and adapters in blunt end cloning. (CO2, K2)

Or

(b) List out findings and strategies of Human Genome Project (HGP). (CO2, K2)

13. (a) Describe the principle and applications of PCR. (CO3, K1)

Or

(b) Write a note on Maxam — Gilbert's method of gene sequencing. (CO3, K2)

14. (a) Explain commercial production of insulin by rDNA technology. (CO4, K2)

Or

(b) Comment on biosteroid transformation. (CO4, K3)

15. (a) Describe liposome mediated gene transfer and microprojectile bombardment. (CO5, K2)

Or

(b) Comment on gene therapy. (CO5, K2)

Part C ($5 \times 8 = 40$)

Answer **all** the questions not more than 1000 words each.

16. (a) Write a detailed description of plasmid vectors. Add a note on YAC vectors. (CO1, K2)

Or

(b) Describe the functions of DNA modifying enzymes other than endonucleases. (CO1, K3)

17. (a) Explain in detail blotting techniques. (CO2, K2)

Or

(b) Write an elaborate procedure for cDNA construction. (CO2, K3)

18. (a) Elaborate on the gene sequencing methods. (CO4, K3)

Or

(b) Explain the variations of PCR. (CO4, K3)

19. (a) Describe how biopolymer is produced by recombinant technique. (CO5, K2)

Or

(b) Explain HBsAg production in yeast by recombinant technique. (CO4, K2)

20. (a) Write an essay on types RNAi based gene silencing silencing. (CO5, K2)

Or

(b) Describe the methods of transgenic plant production with the help of Ti plasmids. (CO5, K2)

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R1040

Sub. Code
530203

M.Sc. DEGREE EXAMINATION, APRIL – 2024

Second Semester

Microbiology

FOOD MICROBIOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. The most spoilage bacteria grows at ————————. (CO2, K2)

(a) Acidic pH (b) Neutral pH

(c) Alkaline pH (d) All of the above

2. Who developed the process of canning? (CO1, K1)

(a) Nicolas Appert (b) Louis Pasteur

(c) Norman Borlaug (d) Walter Hesse

3. The different ACCs between food categories reflect the ————————. (CO1, K1)

(a) Potential shelf life

(b) Potential for the microbial growth during storage

(c) The expected level of contamination of the raw material

(d) All of the above

4. Aerobic colony count (ACC) is also referred as ————————. (CO1, K1)

(a) Total viable count (TVC)

(b) Aerobic plate count (APC)

(c) Standard plate count (SPC)

(d) All of the above

5. What is the most common food preservation methods? (CO3, K4)

(a) Freezing (b) fermentation

(c) heating (d) freeze drying

6. Gerber test is used to determine ————————. (CO4, K5)

(a) Protein percent in milk

(b) Fat present in milk

(c) Acidity of milk

(d) SNF% of milk

7. Pasteurization is a process of heating milk : (CO4, K5)

(a) Above boiling point

(b) below boiling point

(c) above 500 degree Celsius

(d) below 500 degree Celsius

8. How many principles are there in HACCP system? (CO3, K4)

(a) Four (b) Seven

(c) Eighteen (d) Ten

9. *Clostridium perfringers* poisoning is associated with? (CO5, K6)

(a) Meat product (b) vegetables

(c) Canned food (d) Fish product

10. The basic operational and environmental conditions applied to produce safe food are called? (CO3, K4)

(a) HACCP

(b) FASS

(c) FSSAI

(d) Good Manufacturing Practise

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Give a short notes on Airborne bacterial and fungal infection. (CO1, K1)

Or

(b) Give a account on diversity habitat of microorganism in food materials. (CO1, K1)

12. (a) How dose redox potential affect the microbial growth? (CO2, K2)

Or

(b) Factor influencing the development of microbes in food. (CO2, K2)

13. (a) Give short notes on FDA, HACCP and AGMARK. (CO3, K4)

Or

(b) Give short notes on Pasteurization. (CO3, K4)

14. (a) Give short notes on microbes contaminate milk and methylene blue reduction test. (CO3, K4)

Or

(b) Explain about kumiss and kafir production its origin and health benefits. (CO3, K4)

15. (a) How to prevent food spoilage. (CO5, K6)

Or

(b) Food borne illness symptoms, cause and treatment. (CO5, K6)

Part C ($5 \times 8 = 40$)

Answer **all** the questions not more than 1000 words each.

16. (a) Rapid Methods and rules followed in Assessing Food Safety and Quality. (CO1, K1)

Or

(b) Types, symptoms, treatment and outbreak of food borne and waterborne infection. (CO1, K1)

17. (a) Intrinsic and Extrinsic factors that affects the growth and survival of microbes in food. (CO2, K2)

Or

(b) Definition importance and methods of food prevention. (CO1, K1)

18. (a) Explain the types and classification of chemical preservatives and factors affecting it. (CO3, K4)

Or

(b) Discuss technology used in aseptic processing and packaging of food products. (CO3, K4)

19. (a) Explain the procedure and production of any three fermented milk products. (CO3, K4)

Or

(b) Interpret morphological and biochemical characteristics of microbes associated in raw milk. (CO3, K4)

20. (a) Discuss the steps and Methods followed in raw milk processing and packaging. (CO5, K6)

Or

(b) Explain the prevention and Risk Assessment Food-Borne Disease. (CO5, K6)

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R1041

Sub. Code
530503

M.Sc. DEGREE EXAMINATION, APRIL – 2024

Second Semester

Microbiology

Elective — AGRICULTURE AND ENVIRONMENTAL MICROBIOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. The aroma of freshly ploughed land at certain times of the year is probably due to (CO1, K2)

   (a) Bacteria

   (b) Fungi

   (c) Algae

   (d) Actinobacteria

2. Which one among the following is a free living aerobic nitrogen-fixing bacterium? (CO1, K1)

   (a) *Rhizobium*

   (b) *Azotobacter*

   (c) Cyanobacteria

   (d) Actinobacteria

3. Bacterial leaf blight in rice is caused by a species of (CO2, K2)

(a) *Xanthomonas*

(b) *Pseudomonas*

(c) *Bacillus*

(d) *Erwinia*

4. *Cry-IAc* endotoxins obtained from *Bacillus thuringiensis* are effective against (CO2, K4)

(a) Mosquitoes (b) Flies

(c) Nematodes (d) Bollworms

5. Which of the following nutrient cycles is directly propelled by sunlight? (CO3, K3)

(a) Nitrogen cycle (b) Carbon cycle

(c) Phosphorus cycle (d) Sulphur cycle

6. Which of the following are the symptoms of air borne diseases? (CO3, K2)

(a) Abdominal cramps

(b) Fatigue

(c) Loose motion

(d) Sore throat

7. Which one is a brackish water habitat? (CO4, K3)

(a) Lagoon (b) Riverbed

(c) Wetland area (d) Estuaries

8. All the food chains in a single ecosystem are called (CO4, K4)

(a) Trophic level

(b) Multiple food chain

(c) Food web

(d) Single food chain

9. Municipal solid waste is the term used to describe which kind of solid waste? (CO5, K2)

(a) Hazardous (b) Toxic

(c) Non-hazardous (d) Non-toxic

10. From which of the following methods can toxic chemicals be removed? (CO5, K2)

(a) Sorption (b) Adsorption

(c) Absorption (d) Dewatering

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Add a note on the structure of soil with different horizons. (CO1, K2)

Or

(b) Explain the general features and production strategies of VAM biofertilizers. (CO1, K1)

12. (a) Name the pathogens, symptoms and control measures of bacterial diseases of citrus. (CO2, K3)

Or

(b) Give a brief note on the role of fungal based bioinsecticides. (CO2, K2)

13. (a) Illustrate the various stages of the sulphur cycle. (CO3, K3)

Or

(b) Sketch out the conversion of unavailable forms of phosphorus to available forms using a cycle. (CO3, K3)

14. (a) Write in detail about the zonations of the lake ecosystem. (CO4, K2)

Or

(b) Exemplify the microbial communities and characteristic features of coral reef ecosystem. (CO4, K4)

15. (a) Narrate the merits and demerits of the thermal treatment of solid wastes. (CO5, K3)

Or

(b) Discuss the methanogenesis in the treatment of liquid wastes. (CO5, K5)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Give an elaborate account on microbial interactions with examples. (CO1, K2)

Or

(b) Describe the steps of the symbiotic association of microbes in root nodules. (CO1, K4)

17. (a) How do plants protect themselves? Explain elaborately. (CO2, K6)

Or

(b) Elucidate the mechanism of *Bacillus thuringiensis* in pest control strategies. (CO2, K5)

18. (a) What is the bio-geo chemical cycle? Discuss the nitrogen cycle. (CO3, K4)

Or

(b) Write a detailed account on air borne microbes and diseases. (CO3, K4)

19. (a) Give a detailed account on the factors affecting the growth of microbes in aquatic environments. (CO4, K4)

Or

(b) Define the food chain and food web. Explain them with examples. (CO4, K3)

20. (a) Explain the various types of composting technology. Give their role in solid waste management. (CO5, K2)

Or

(b) Explicate the production of biogas from liquid wastes. (CO5, K4)

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R1042

Sub. Code
530401

M.Sc. DEGREE EXAMINATION, APRIL – 2024

Fourth Semester

Microbiology

APPLIED MICROBIOLOGY – II

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Which of the following resources can be most helpful in determining whether additional chemical or biological water sample testing is required? (CO1, K3)

   (a) Water hardness

   (b) The yield capacity of the water quality

   (c) A sanitary survey

   (d) The time of year

2. Which common indicator organism is employed when assessing drinking water quality? (CO1, K1)

   (a) *Escherichia coli* (b) Faecal coliform

   (c) Total coliform (d) Algae

3. ———— salts are used in many fruit processing operations in concentration below 0.1%. (CO2, K2)

   (a) Calcium (b) Magnesium

   (c) Sodium (d) Sulphate

4. Which of the following are the three main hazards defined in HACCP? (CO2, K2)

(a) Chemical/Biological and physical hazards

(b) Organic/Biological and physical hazards

(c) Non living/living and physical hazards

(d) Chemical/Biological and viral hazards

5. Which of the following is used as an assay of riboflavin status? (CO3, K3)

(a) FIGLU (b) Pyruvaye dehydrogenease

(c) Transketolase (d) Glutathione reductase

6. Which of the following is not a pyrogen test? (CO3, K5)

(a) LAL test (b) Rabbit test

(c) Sham test (d) Gel clot test

7. _____ provides information on hazards in food to be linked directly to data on the risk of human health and to improve the food safety decision-making process. (CO4, K4)

(a) Biological hazard (b) Risk analysis

(c) FOSCORIS (d) Chemical hazard

8. How much sugar is necessary for the preservation of fruits? (CO4, K2)

(a) 45% (b) 58%

(c) 40% (d) 66%

9. The target micro organism in fish canning is _____. (CO5, K4)

(a) *Clostridium botulinum*

(b) *Streptococcus thermophilus*

(c) PA 3679

(d) Lactobacillus bulgaricus

10. The addition of these adulterants lowers the ———————— value of food. (CO5, K5)

(a) Substance (b) Quality

(c) Nutrients (d) Quantity

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Enlighten the biological oxygen demand of a water sample. (CO1, K2)

Or

(b) Exemplify the microbial load of the water sample and its significance. (CO1, K2)

12. (a) Narrate the role of preservatives in the shelf life of pharmaceutical products. (CO2, K2)

Or

(b) Give a short note on sterility testing. (CO2, K1)

13. (a) Describe the chromogenic method of endotoxin tests. (CO3, K2)

Or

(b) Illustrate the methods of de-pyrogenation. (CO3, K4)

14. (a) Give the applications of light pulse technology. (CO4, K3)

Or

(b) Brief the quality control in fruits and vegetable processing. (CO4, K5)

15. (a) Demonstrate the genome-based assessment of the microbial quality of marine foods. (CO5, K6)

Or

(b) List out the applications of food additives. (CO5, K3)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Elaborate on the stages of mineral water purification in a water plant. (CO1, K4)

Or

(b) Describe the detailed methods of microbial quality assessment of water. (CO1, K5)

17. (a) Delineate the microbial enumeration test in the finished pharmaceutical product. (CO2, K5)

Or

(b) Explain the microbial risk assessment through the HACCP plan. (CO2, K2)

18. (a) Elucidate the methods of antimicrobial sensitivity assay. (CO3, K3)

Or

(b) Explicate: risk assessment of parenteral manufacturing. (CO3, K4)

19. (a) Write the principles of light pulse generation and its modes of action. (CO4, K5)

Or

(b) Illustrate the physical, chemical and biology hazardous risk assessment in food industry. (CO4, K5)

20. (a) Explain the conventional and recent development methods for microbial quality assessment in marine foods. (CO5, K5)

Or

(b) Explain - food safety and food standards. (CO5, K4)

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