

Question Paper

Exam Date & Time: 14-Nov-2023 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION-NOVEMBER 2023

SUBJECT: BBT-201 GENETICS
(OBE 2021 REVISED REGULATION)

Answer ALL questions in a descriptive manner, using illustrations as required.

Marks: 70

Duration: 180 mins.

1) Short notes

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|-----|--|-----|
| 1A) | What is Eugenics? | (1) |
| 1B) | Define phenocopy | (1) |
| 1C) | What is teratogen? | (1) |
| 1D) | What is the formula for finding the crossing-over frequency? | (1) |
| 1E) | What is an isochromosome? | (1) |
| 1F) | What is an example of nonsense mutation? | (1) |
| 1G) | What is genetic linkage? | (1) |
| 1H) | Define holandric genes | (1) |
| 1I) | What is co-dominance? | (1) |
| 1J) | What do you mean by dosage compensation? | (1) |

2) Short essay type

- | | | |
|-----|--|-----|
| 2A) | Explain the law of independent assortment with a suitable example. | (5) |
| 2B) | Explain the XX-XY and ZZ-ZW type of sex determination. | (5) |
| 2C) | What is linkage? Name different types of linkage. Explain the factors affecting Linkage. | (5) |
| 2D) | Describe clinical phenotypes of Klinefelter syndrome | (5) |
| 2E) | Explain cytoplasmic inheritance with a suitable example | (5) |
| 2F) | Give a brief note on cancer and its hallmarks | (5) |

3) Essay type

- | | | |
|-----|--|------|
| 3A) | With a labelled diagram describe the structure of a chromosome and its abnormalities. | (10) |
| 3B) | Explain non-allelic gene interaction in fowls | (10) |
| 3C) | Explain in detail about DNA fingerprinting technique and write about its applications. | (10) |

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Question Paper

Exam Date & Time: 16-Nov-2023 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION-NOVEMBER 2023
SUBJECT: BBT-203 MOLECULAR BIOLOGY
(OBE 2021 REVISED REGULATION)

Marks: 70

Duration: 180 mins.

Answer all questions, illustrate where necessary

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|-----|--|-----|
| 1A) | What are essential and non-essential amino acids? Give examples. | (1) |
| 1B) | Give any two properties of a good vector. | (1) |
| 1C) | Define phosphodiester bond. | (1) |
| 1D) | What are plasmids? | (1) |
| 1E) | Define promoter. | (1) |
| 1F) | What is transcription? | (1) |
| 1G) | Define RNA editing. | (1) |
| 1H) | Define heterochromatin. | (1) |
| 1I) | Give an example for DNA-binding protein motifs. | (1) |
| 1J) | What are second messengers? | (1) |

2) Short essay answers

- | | | |
|-----|---|-----|
| 2A) | Explain Watson and Crick model of DNA double helical structure with a neat, labelled diagram. | (5) |
| 2B) | Explain semi-conservative model of DNA replication. Discuss Meselson and Stahl experiment. | (5) |
| 2C) | Write a short note on DNA polymerases in prokaryotes and eukaryotes. | (5) |
| 2D) | Elaborate of electrophoretic mobility shift assay. | (5) |
| 2E) | Discuss the transient changes in genome activity. | (5) |
| 2F) | How does DNA methylation control gene expression? | (5) |

3) Long essay answers

- | | | |
|-----|---|------|
| 3A) | Write an essay on
i) DNA damaging agents
ii) Base-excision repair mechanism. | (10) |
| 3B) | Write the functions of
i) Carbohydrates
ii) Proteins | (10) |

iii) Lipids.

3C) Explain the process of mRNA processing with illustration. (10)

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Question Paper

Exam Date & Time: 28-Dec-2023 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER BSc. (BIOTECHNOLOGY) DEGREE EXAMINATION - DEC 2023 / JAN 2024
SUBJECT: BBT-203 MOLECULAR BIOLOGY
(OBE-2021 REVISED REGULATION - REPEATERS)

Marks: 70

Duration: 180 mins.

Answer all the questions.

Illustrate where necessary.

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|-----|---|-----|
| 1A) | Explain the structure of a nucleotide. | (1) |
| 1B) | Write two examples for disaccharides. | (1) |
| 1C) | Write two examples for aromatic amino acids. | (1) |
| 1D) | Define chromosomes. | (1) |
| 1E) | Define euchromatin? | (1) |
| 1F) | What are transcription factors? | (1) |
| 1G) | Define glycosidic bond. | (1) |
| 1H) | Describe briefly at least 3 different forms of DNA. | (1) |
| 1I) | What are promoters? | (1) |
| 1J) | Write the importance of CTD. | (1) |

2. Short essay answers:

- | | | |
|-----|---|-----|
| 2A) | Explain DNA mismatch repair in <i>E.coli</i> . | (5) |
| 2B) | What is DNA replication? Discuss the role of various enzymes in DNA replication in prokaryotes. | (5) |
| 2C) | Explain the nucleosome model of chromosome packaging. | (5) |
| 2D) | Give an account of histone modifications. | (5) |
| 2E) | How does extracellular signaling compound could influence genome activity? | (5) |
| 2F) | Explain RNA editing with example. | (5) |

3. Long essay answers:

- | | | |
|-----|--|------|
| 3A) | Write a note on Ti plasmids. Explain with a neat diagram, how Ti plasmids are used in introducing genes into plants. | (10) |
| 3B) | Explain: 1) nucleotide excision repair mechanism and 2) base excision repair mechanism in prokaryotes. | (10) |
| 3C) | Elaborate on prokaryotic transcription. | (10) |

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Question Paper

Exam Date & Time: 21-Nov-2023 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION-NOVEMBER 2023
SUBJECT: BBT-205 DEVELOPMENTAL BIOLOGY
(OBE 2021 REVISED REGULATION - REGULARS/REPEATERS)

Marks: 70

Duration: 180 mins.

Answer all questions in a descriptive manner, using illustrations as required.

1) Short notes :

- | | | |
|-----|---|-----|
| 1A) | What is Virgin Birth? | (1) |
| 1B) | What is the ploidy level of male honey bees? | (1) |
| 1C) | With a suitable example define multipotency. | (1) |
| 1D) | What is corpus luteum | (1) |
| 1E) | Name male accessory glands? Note on their functions. | (1) |
| 1F) | What is diplotene? Where does it occur? | (1) |
| 1G) | What is Holoblastic cleavage? Give a suitable example. | (1) |
| 1H) | What is the role of estrogen and progesterone in the menstrual cycle? | (1) |
| 1I) | Differentiate between blastomere and morula | (1) |
| 1J) | Which three shunts are present in the fetal circulation? | (1) |

2) Short essay :

- | | | |
|-----|---|-----|
| 2A) | Highlight the implications of growth regulators in induced parthenocarpy | (5) |
| 2B) | Explain the life cycle of Honey bees, highlighting the ploidy changes | (5) |
| 2C) | What is somatic embryogenesis? How is it induced both naturally and artificially? | (5) |
| 2D) | A brief note on pharyngeal arches and their derivatives | (5) |
| 2E) | Write a note on neural tube formation and its significance | (5) |
| 2F) | Draw and label the adult testis's TS of seminiferous tubules. | (5) |

3) Essay :

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|-----|--|------|
| 3A) | Describe the transportation of male and female gametes and discuss the process of fertilization. | (10) |
| 3B) | What are the three regions of mesoderm? Describe the intraembryonic mesoderm and its fate. | (10) |
| 3C) | Describe the stages of zygotic embryogenesis in monocot species | (10) |

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Question Paper

Exam Date & Time: 23-Nov-2023 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION - NOVEMBER 2023

SUBJECT: BBT-207 BIOPHYSICS

(OBE 2021 REVISED REGULATION - REGULARS & REPEATERS)

Marks: 70

Duration: 180 mins.

Answer all the questions.

- 1A) Expand OCT. (1)
- 1B) How ITC is used to determine thermodynamic characteristics of a sample? (1)
- 1C) What are the main characteristic peaks in DSC curve? (1)
- 1D) Give "nitrogen rule" applicable in mass spectrometry. (1)
- 1E) What is the similarity between NMR and MRI? (1)
- 1F) What are the difference between spontaneous and stimulated emission? (1)
- 1G) What is quantum dot? (1)
- 1H) Write down the condition of Fluorescence Resonance Energy Transfer (FRET). (1)
- 1I) Write down four characteristics of LASER. (1)
- 1J) Define Beer' Lambert's law. (1)
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- 2A) Discuss the working principle of differential scanning calorimetry. (5)
- 2B) Draw Jablonski's diagram and explain various processes following absorption of radiation by a molecule using the diagram. (5)
- 2C) Write a short note on optical properties of tissues. (5)
- 2D) Write a short note on Surface Plasmon Resonance (SPR) and application. (5)
- 2E) Describe the working principles of FTIR spectroscopy and its advantages over IR spectroscopy in chemical analysis. (5)
- 2F) Write a short note on Raman Spectroscopy explaining the principle and applications. (5)
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- 3A) **Write a note on:** (10)
i) Photomorphogenesis and
ii) Photodynamic therapy.
- 3B) Describe how nucleus decided as NMR active and the theory of NMR spectroscopy and hence the ^1H NMR spectrum of methanol. (10)
- 3C) Explain the working principle of confocal microscope with schematic diagram. (10)

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