Question Paper

Exam Date & Time: 09-Jun-2023 (10:00 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION - JUNE 2023
SUBJECT: BBT-301 - MICROBIAL BIOTECHNOLOGY
(OBE-2020 REGULATION - REPEATERS)

Marks: 70 **Duration: 180 mins.**

Answer all the questions.

Illustrate where necessary.

1A)	What is water activity?	(1)
1B)	What is a diagnostic medium?	(1)
1C)	What is E-tongue?	(1)
1D)	What is Pascalization?	(1)
1E)	What are spargers?	(1)
1F)	What is ADC and DAC?	(1)
1G)	What is generation time?	(1)
1H)	Name the microbes used for the production of citric acid.	(1)
1I)	What are psychrophiles and thermophiles?	(1)
1J)	Name any two fungi responsible for food-borne diseases.	(1)
2A)	Write a note on dye reduction test.	(5)
2B)	Write a brief note on various agencies involved in maintaining food quality standards.	(5)
2C)	Give a brief note on airlift fermenter and hollow fibre reactor.	(5)
2D)	What is strain preservation? What are the different methods involved in strain preservation?	(5)
2E)	Briefly explain role of microbes in food bio-preservation and food additives.	(5)
2F)	Explain the role of microorganisms in the field of food microbiology.	(5)
3A)	Write a note on food preservation by radiation.	(10)
3B)	Explain in detail upstream and downstream processes in fermentation.	(10)
3C)	Discuss the growth medium used for the industrial bioprocesses and write a note on role of its each ingredient.	(10)

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Question Paper

Exam Date & Time: 07-Jun-2023 (10:00 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION - JUNE 2023
SUBJECT: BBT-305 - ADVANCED GENOMICS
(OBE-2020 REGULATION - REPEATERS)

Marks: 70 **Duration: 180 mins.**

Answer all the questions.

Illustrate where necessary.

1. **One-mark answers.**

1A)	Define epigenetic writers and erasers.	(1)
1B)	Define synthetic lethality.	(1)
1C)	What are causative SNPs?	(1)
1D)	Define plasmids.	(1)
1E)	Define genes.	(1)
1F)	What does ELSI program of human genome project refer to?	(1)
1G)	List at least two genetic mapping markers.	(1)
1H)	Name the three scientists who are credited with the discovery of RNA dependent DNA polymerase.	(1)
1I)	Define microsatellite.	(1)
1J)	What are ERVs?	(1)

2. **Short essay answers:**

2A)	Describe the role of the RISC complex in gene regulation.	(5)
2B)	Briefly describe genome imprinting. Add a note on imprinting disorders.	(5)
2C)	Explain how glucose regulates the *lac* operon in *E. coli*.	(5)
2D)	Describe the repeat elements of eukaryotic genomes.	(5)
2E)	Explain what are SINEs and LINEs.	(5)
2F)	Explain the classification of restriction endonucleases.	(5)

3. **Long essay answers:**

3A)	Write an essay on the impact of gene polymorphism on pharmacokinetic drug response with suitable examples. Add a note on the impact of adverse drug reactions on human health.	(10)
3B)	Explain the processes involved in sequencing the human genome.	(10)

3C)	Discuss origin of genomes with a note on the important discoveries that support the RNA world hypothesis.	(10)

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Question Paper

Exam Date & Time: 12-Jun-2023 (10:00 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION - JUNE 2023
SUBJECT: BBT-307 - NANOBIOTECHNOLOGY
(OBE-2020 REGULATION - REPEATERS)

Marks: 70 **Duration: 180 mins.**

Answer all the questions.

Illustrate where necessary.

1A)	How solid lipid nanoparticles are classified?	(1)
1B)	What are the challenges involved in using internal triggers for the drug delivery?	(1)
1C)	List the ideal properties of nanoparticles used for the drug delivery.	(1)
1D)	What are dye exclusion assays? Give example.	(1)
1E)	Give two examples for metal nanoparticles and metal oxide nanoparticles.	(1)
1F)	What are reactive oxygen species? Give examples.	(1)
1G)	What is nanopesticides? Give example.	(1)
1H)	What are complex forming agents? Give examples.	(1)
1I)	Write any two important milestones in the development of nanotechnology.	(1)
1J)	Write about classification of carbon nanotubes based on chirality.	(1)
2A)	Explain any one method of chemical targeting using prodrug concept.	(5)
2B)	Write a note on 'polymeric nanoparticles for drug delivery'.	(5)
2C)	Give a brief account on nano-pollution.	(5)
2D)	Give a brief note on different types of nanomaterials.	(5)
2E)	Explain the principle of sol gel method and chemical vapor deposition in the synthesis of nanomaterials.	(5)
2F)	Explain the surface plasmon resonance and quantum confinement.	(5)
3A)	Discuss the following mechanism of magnetic targeting in DDS. (i) Triggered Release (ii) Magnetofection (iii) Embolotherapy (iv) Hyperthermia	(10)
3B)	Explain in detail the role of nanomaterials in diagnostics.	(10)
3C)	i)Explain the principle of scanning electron microscope, schematic diagram of instrumentation, type of interaction between material and electron. What information are obtained using SEM? ii) Discuss any two methods used to synthesize polymeric nanoparticles. (5+5 = 10 marks)	(10)

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MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B. Sc. BIOTECHNOLOGY DEGREE EXAMINATION - JUNE 2023
SUBJECT: BBT-309 - RESEARCH METHODOLOGY
(OBE-2020 REGULATION - REPEATERS)

Marks: 70 **Duration: 180 mins.**

Answer all the questions.

Illustrate where necessary.

1A)	Which risk group organisms are handled in BSL2 laboratories? Give one example.	(1)
1B)	Define good laboratory practice.	(1)
1C)	What do you mean by variable? Give one example.	(1)
1D)	What are carcinogens?	(1)
1E)	Define the impact factor of a journal.	(1)
1F)	Name any two national research funding agencies.	(1)
1G)	Define science editing tools.	(1)
1H)	What is sample design?	(1)
1I)	How hypothesis is different from the aim of the research?	(1)
1J)	What is a research problem?	(1)
2A)	Write a note on qualitative and quantitative research.	(5)
2B)	Give an account of chemical inventorying and its importance.	(5)
2C)	What are the goals of a poster presentation?	(5)
2D)	What are the different types of review articles? Add a note on the importance of review articles.	(5)
2E)	Write a note on data collection.	(5)
2F)	Write a note on documentation.	(5)
3A)	Discuss the purpose and process of the research.	(10)
3B)	Discuss the different components of a scientific paper.	(10)
3C)	Write one research problem of your choice and explain how you will proceed with it.	(10)

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MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.Sc. BIOTECHNOLOGY DEGREE EXAMINATION - JUNE 2023
SUBJECT: BBT-303 - BIOSTATISTICS
(OBE-2020 REGULATION - REPEATERS)

Marks: 70 **Duration: 180 mins.**

Answer all the questions.

1A) Both probability and correlation coefficient ranges from 0 to 1. This statement is (True/False)? (1)

1B) What is the standard error associated with difference in means? (1)

1C) A ∩ B is the event that both A and B doesn't occur simultaneously. (True/False). (1)

1D) Median is _____ quartile. (First/Second/Third). (1)

1E) Define Type-I error. (1)

1F) What is a parameter? (1)

1G) What is the nonparametric analogues test for the Two Independent Group t-test? (1)

1H) Define Null Hypothesis? (1)

1I) Which discrete probability distribution have equal mean and variance? (1)

1J) The sum of deviations of all observations from their mean is _____. (1)

2A) Below given are the descriptive on Diastolic Blood Pressure measured for patients attending a heart studies. Using a 90% confidence level (5)
a) Compute the Margin of Error associated with population mean.
b) Also, the Confidence interval for the true population mean.

Characteristic	n	Sample Mean	Sample Standard Deviation
Total Serum Cholesterol	3,310	200.3	36.8

(2+3 = 5 marks)

2B) What is the desired sample size to achieve 5 mg/l plasma lamotrigine among patients who have seizures with 0.5 mg/l precision and 95% confidence? Based on a pilot study, the standard deviation of plasma lamotrigine was 2 mg/l. (5)

2C) Which are the plots to be used when you have below situations? (5)
a) Categorical variables.
b) Continuous variables.
c) To check the linear relation between two continuous variables.
(2+2+1 = 5 marks)

2D) Which are the two types of sampling methods? Under each type list three sampling techniques respectively. (5)

2E) a) Define coefficient of variation. (5)
b) Mean and Standard deviation of Systolic Blood Pressure of a group of adults is 130mmHg and 4mmHg respectively and that of weight is 60kg and 3kg respectively. Which of these characteristics are more consistent?
(2+3 = 5 marks)

2F) A study reported on a retrospective review of initial sonograms performed on 65 twin gestations to evaluate the ability of sonography to distinguish monochorionic from dichorionic gestations based on the thickness of the membrane separating the fetuses. The results are shown in the contingency table below: (5)
a) Calculate sensitivity from below given data.
b) Calculate specificity from the given data.

	Condition	
Ultrasound	Dichorionicity	Monochorionicity

Exam Result	(D)	(D')	Total
Thick membrane (+)	39	8	47
Thin membrane (−)	3	15	18
Total	42	23	65

(3+2 = 5 marks)

3. An investigator notices that children develop chronic bronchitis is 5% in the first year of life. If we select 20 children at random.

3A)	What is the probability that at least 3 children are with chronic bronchitis?	(4)
3B)	Exactly 3 are with chronic bronchitis.	(2)
3C)	At most 2 suffer from the disease.	(4)

4) In a study we got the Multiple linear regression equation as follows:
Birth weight = -3.201 + (0.038* Mother's_ Weight) + (0.021* Mother's_ Height) - (0.175*Gender)
Adjusted R2 =0.711

4A)	Which is the Response variable here?	(1)
4B)	Which are the Explanatory Variables?	(1)
4C)	What is the interpretation of the above multiple linear regression equation?	(3)
4D)	What does Adjusted R2 =0.711 indicate?	(1)
4E)	What are the assumptions of simple linear regression?	(4)

5A)	What are the characteristics of Normal distribution?	(5)
5B)	The test scores for a Government selection exam are normally distributed with a mean of 150 and standard deviation of 7. Find the standard z-score for a person with a score of: (i)160 and (ii)140	(5)

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