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M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
GENETICS

Cellular and Molecular Biology (MSC29108)

Day & Date: Thursday, 11-01-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

Instructions: 1) Question 1 and 2 are compulsory.
 2) Attempt any Three from Q.3 to Q.7.
 3) Figure to right indicate full marks.

Q.1 A) Choose the correct alternatives from the given options. 10

- 1) In eukaryotes mRNA is transcribed by _____.
 a) RNA polymerase I b) RNA polymerase II
 c) RNA polymerase III d) Poly A polymerase
- 2) _____ codon codes for formylated methionine in eukaryotes.
 a) UAA b) AUG
 c) UGA d) UAG
- 3) In prokaryotes _____ is known as major replicase enzyme.
 a) DNA polymerase I b) DNA polymerase II
 c) DNA polymerase III d) DNA polymerase IV
- 4) Intermediate filaments are polymer of _____.
 a) Tubulin dimer b) Globular actin
 c) Albumin d) Lamin
- 5) Plasma membrane acts as _____ barrier.
 a) impermeable b) selectively permeable
 c) freely permeable d) transparent
- 6) _____ is the process by which solutes are moved along a concentration gradient across cell membrane.
 a) Simple diffusion b) Active transport
 c) Proton pump d) Na-k ATPase pump
- 7) In prokaryotes, transcription process is terminated by _____.
 a) Sigma factor b) Rho factor
 c) Pol- α d) Core enzyme
- 8) _____ are also known as Macula adherens.
 a) Desmosomes b) Hemi-desmosomes
 c) Gap junctions d) Tight junctions
- 9) RAS genes belong to the small _____ protein family.
 a) guanosine 5'-triphosphatase
 b) adenosine 5'-triphosphatase
 c) cytosine 5'-triphosphatase
 d) thymidine 5'-triphosphatase
- 10) The _____ checkpoint is also known as restriction point in cell cycle.
 a) G1 checkpoint b) G2 checkpoint
 c) M checkpoint d) S checkpoint

B) Fill in the blanks.**06**

- 1) Start point of DNA replication is known as _____.
- 2) Kinesins are _____ end directed motor proteins of microtubules.
- 3) Fluid and mosaic model of plasma membrane was proposed by _____.
- 4) _____ proposed the Hairpin loop model of tRNA molecule.
- 5) _____ are microscopic channels that directly connect the cytoplasm of neighboring plant cells.
- 6) _____ sequences are identified as Shine-Dalgarno sequences in prokaryotes.

Q.2 Answer the following.**16**

- a) Describe different types of DNA polymerases in prokaryotes.
- b) Write a note on ribozymes.
- c) Describe structure and functions of intermediate filaments.
- d) Write a note on gap junctions.

Q.3 Answer the following.**16**

- a) Describe mechanism of replication in prokaryotes.
- b) Describe mechanism of transcription in eukaryotes.

Q.4 Answer the following.**16**

- a) Describe properties of genetic code with suitable examples.
- b) Describe structure and functions of microtubules.

Q.5 Answer the following.**16**

- a) Explain process of vesicular transport between ER and Golgi apparatus.
- b) Describe different phases eukaryotic cell cycle.

Q.6 Answer the following.**16**

- a) Describe mechanism of translation in prokaryotes.
- b) Explain structure and functions of microtubule associated motor proteins.

Q.7 Answer the following.**16**

- a) Give G protein coupled signal transduction pathway.
- b) Describe mechanism of signal transduction in plants with any suitable example.

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M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
GENETICS
Genetic Engineering (MSC29302)

Day & Date: Sunday, 07-01-2024
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

Instructions: 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

Q.1 A) Choose correct alternative.

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- Approximate size of lambda phage is _____.
 - 23 kb
 - 100 kb
 - 49 kb
 - 12 kb
- _____ cleaves both single and double stranded DNA molecules, in a non-specific manner.
 - S1 Nuclease
 - Bal31
 - DNase I
 - BamHI
- EcoRI has _____ hexa-nucleotide recognition sequence.
 - GAATTC
 - GGATCC
 - AGATCT
 - GCAGCA
- _____ DNA ligase enzyme is used in genetic engineering.
 - Bacterial ligase
 - T4 ligase
 - Yeast ligase
 - Pseudomonas ligase
- _____ is the function of a polynucleotide kinase.
 - Removal of the phosphate group from 5' end
 - Removal of the phosphate group from 3' end
 - Addition of phosphate group on 5' end
 - Addition of phosphate group on 3' end
- LacZ gene present in a PUC series plasmid code for _____ enzyme.
 - Beta-galactosidase
 - Lactase
 - Amylase
 - Nuclease
- In screening for pUC18 recombinants, _____ coloured colonies will be the desired recombinants.
 - Blue
 - Colourless
 - White
 - Yellowish

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- 8) The principle of Sanger's method relies on _____.
a) Use of chemicals for base specific cleavage
b) Use of dNTPs for chain termination
c) Use of ddNTPs for chain termination
d) Use of ^{32}P for chain termination
- 9) _____ is a combination of cloned complementary DNA fragments inserted into a collection of host cells, which constitute some portion of the transcriptome of the organism.
a) cDNA library b) Genomic library
c) RNA library d) Protein library
- 10) The cloning capacity of BAC vectors is up to _____.
a) 10 kb b) 50 kb
c) 2000 kb d) 300 kb

Q.1 B) Fill in the blanks.

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- 1) The single stranded loop region is cleaved by using _____ enzyme.
2) Amplification of plasmids is carried out by _____ antibiotic.
3) The most widely used chemical for protoplast fusion is _____.
4) Autonomously replicating sequences is a characteristic feature of _____ vectors.
5) _____ is an imaging technique that uses radioactive sources contained within the exposed sample.
6) To be able to coexist in the same cell, different plasmids must be _____.

Q.2 Answer the following.

16

- a) Agrobacterium rhizogenes
b) Diagnosis of Malaria
c) Alkaline Phosphatase
d) Shuttle Vector

Q.3 Answer the following.

- a) What are the characteristics of ideal plasmid vectors? Discuss pBR322 with its ideal features.
b) Enlist genetic engineering tools with their significance.

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Q.4 Answer the following.

- a) Take a detailed account of PCR technique and its types.
b) Chromosome walking.

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Q.5 Answer the following.

- a) What is cDNA library? Write on its Construction.
b) Discuss in detail steps involved in entire gene cloning procedure.

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SLR-EK-11

Q.6 Answer the following.

- a)** Describe DNA sequencing by Sanger's dideoxy chain termination method. **10**
- b)** Write on Transformation of cell by PEG mediated microinjection. **06**

Q.7 Answer the following.

- a)** Describe production of Hepatitis B vaccine by Genetic Engineering. **08**
- b)** Discuss development of Herbicide-resistant plants by Genetic Engineering. **08**

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Set P

Day & Date: Tuesday, 09-01-2024
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

Instructions: 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Rewrite the sentence using correct alternative. 10

- _____ nucleotides are present in the human genome.
 - 3164.7 million
 - 2015.9 million
 - 1982.0 million
 - 3247.9 million
- Each DNA spot contains _____ of a specific DNA sequence, known as probes.
 - Micromoles
 - picomoles (10^{-12} moles)
 - gm Moles
 - picomoles (10^{-50} moles)
- _____ is a procedure by which amniotic fluid is removed from the uterus for diagnosis purpose.
 - Amniocentesis
 - Chorionic villus sampling
 - Angioplasty
 - Ultrasound technology
- The antigens for ABO and Rh blood groups are present on _____.
 - plasma
 - white blood cells
 - red blood cells
 - platelets
- _____ is a type of autosomal recessive genetic disorder.
 - Haemophilia
 - Skeletal dysplasia
 - Sickle cell anemia
 - Down Syndrome
- Adult haemoglobin (HbA) is a tetramer consisting of _____.
 - $\alpha 2\beta 2$
 - $\alpha 2\delta 2$
 - $\alpha 2\gamma 2$
 - $\beta 4$
- ADA deficiency is caused due to _____ the gene for adenosine deaminase.
 - addition
 - change
 - deletion
 - multiplication
- In the first step of gene therapy, _____ from the blood of the patient are grown in a culture outside of the body.
 - red blood cells
 - lymphocytes
 - neurons
 - platelets
- Release of water-soluble drugs can be retarded by presenting it as _____ suspension.
 - Oil
 - Water
 - Colloidal
 - Freezing

- 10) _____ compounds are excreted through the lungs.
- | | |
|---------------------------|-------------------------------|
| a) Lipophilic | b) Gaseous |
| c) Liquid and hydrophilic | d) Solid less than 100 Dalton |

B) Fill in the blanks.**06**

- 1) The HTT gene mutation that causes HD involves a DNA segment known as a _____ trinucleotide repeat.
- 2) _____ invented Gene Therapy.
- 3) _____ are the stem cells that give rise to other blood cells.
- 4) HLA stands for _____.
- 5) _____ is the oxygen binding site of the haemoglobin
- 6) _____ is a molecular cloning technique that relies on prior knowledge of the encoded protein's sequence or function for gene identification.

Q.2 Answer the following.**16**

- a) Write short note on Amniocentesis.
- b) Write short note on Phenylketonuria.
- c) Explain in short Paternity testing.
- d) Explain In-vivo Gene therapy.

Q.3 Answer the following.**08**

- a) Explain in detail Stem cell sources.
- b) Explain goals of Human genome project.

08**Q.4 Answer the following.**

- a) Give an account on Agammaglobulinemia.
- b) Explain in detail Therapeutic applications of stem cells as regenerative medicine.

10**06****Q.5 Answer the following.**

- a) Write an account on Similarities and differences between adult and embryonic stem cells.
- b) Describe in brief Route of drug administration.

08**08****Q.6 Answer the following.**

- a) Write an account of Types of Gene therapy.
- b) Explain Pharmacogenetic study of drug.

10**06****Q.7 Answer the following.**

- a) Write note on Bioavailability of drugs.
- b) Give an account on Ex-vivo gene therapy.

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Set **P**

M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
GENETICS

Agriculture Science and Seed Technology (MSC29403)

Day & Date: Wednesday, 20-12-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figure to right indicate full marks.

Q.1 A) Multiple choice questions.

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- 1) Seeds are Treated with _____ for Stratification.
 - a) Moist seed in low temperature
 - b) Just low temperature
 - c) Warm and moist temperature
 - d) Normal seeds in low temperature
- 2) An Example of Gaseous Plant Hormone is _____.
 - a) IAA
 - b) Gibberellin
 - c) Ethylene
 - d) Absciscic acid
- 3) The Sugar found in large amount in germinating seed is _____.
 - a) Lactose
 - b) Sucrose
 - c) Mannose
 - d) Maltose
- 4) Seed coat is derived from _____.
 - a) Endosperm
 - b) Testa
 - c) Embryo
 - d) Nucleus
- 5) Most of the plants obtain nitrogen from the soil in the form of _____.
 - a) Nitrate
 - b) Nitrite
 - c) Nitric acid
 - d) Nitrous oxide
- 6) _____ is not a bio-fertilizer.
 - a) Mycorrhiza
 - b) *Rhizobium*
 - c) *Agrobacterium*
 - d) *Nostoc*
- 7) Indole-3-acetic acid is the most common naturally occurring plant hormone of _____ class.
 - a) Gibberellin
 - b) Auxin
 - c) Ethylene
 - d) Cytokinin
- 8) The Plant breeding experiments are generally carried out in _____.
 - a) Colleges
 - b) Schools
 - c) Government institutions
 - d) Botanical gardens
- 9) Germination is inhibited by _____.
 - a) Red light
 - b) Blue light
 - c) IR light
 - d) UV light
- 10) Fungi and bacteria usually enter through _____.
 - a) Stomata
 - b) Wounds
 - c) Hydathodes
 - d) Stem

B) Fill in the blanks OR Write true/false.**06**

- 1) Post processing of the compost leads to increase in quality.
 - a) True
 - b) False
- 2) In plant root pressure is responsible for guttation.
 - a) True
 - b) False
- 3) Absorption of water and minerals take place in root epidermis.
 - a) True
 - b) False
- 4) Transpiration mostly affected by temperature.
 - a) True
 - b) False
- 5) Seedlessness in fruits is called as parthenogenesis.
 - a) True
 - b) False
- 6) A sound seed certification programme requires direct participation of breeder.
 - a) True
 - b) False

Q.2 Answer the following.**16**

- a) Explain plant response to pathogens and herbivores.
- b) Explain process of Biomineralization.
- c) Explain mixed farming with any example.
- d) Explain new national seed policy.

Q.3 Answer the following.

- a) Explain Physical and chemical properties of soil.
- b) Explain physiological and molecular response of plants to water and temperature stress.

08**08****Q.4 Answer the following.**

- a) Explain process of guttation.
- b) Explain plant growth hormones and its importance.

08**08****Q.5 Answer the following.**

- a) Explain absorption and translocation of water in plants.
- b) Explain biofertilizers with any one example.

08**08****Q.6 Answer the following.**

- a) Explain Terminator technology.
- b) Explain Seed dormancy and germination.

08**08****Q.7 Answer the following.**

- a) Explain process of production, processing and testing of seeds of crop plants.
- b) Explain role of National seed Corporation in production.

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