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**M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022
(GENETICS)**

Concept of Genetics

Day & Date: Monday, 13-02-2023
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) All questions carry equal marks.
4) Draw neat and labeled diagrams wherever necessary.

Q.1 A) Choose Correct Alternative. 10

- 1) The *A. thaliana* genome was sequenced in the year _____ and there are approximately _____ protein coding genes
 - a) 1997, 27000
 - b) 2000, 27000
 - c) 2000, 30000
 - d) 1998, 30000
- 2) In the absence of _____ embryonic gonadal tissue would normally develop into an ovary.
 - a) SRY
 - b) maleness producing factor
 - c) X chromosome
 - d) genital-determining factor
- 3) An individual with two different forms of an allele is called _____.
 - a) Heterosexual
 - b) Heteroptical
 - c) Heterodyne
 - d) Heterozygous
- 4) The ratio of X chromosomes to haploid sets of autosomes determines sex in _____.
 - a) Humans
 - b) Crocodiles
 - c) Drosophila
 - d) Chickens
- 5) Because of dominant epistasis, the classical 9:3:3:1 ratio becomes _____.
 - a) 12:3:1 ratio
 - b) 12:4 ratio
 - c) 9:3:4 ratio
 - d) 15:1 ratio
- 6) The two most commonly used base analogs are 5-bromouracil and 2-aminopurine. The pyrimidine 2-aminopurine is a _____ analog.
 - a) both guanine and adenine
 - b) Guanine
 - c) Adenine
 - d) Thymine
- 7) Male honey bees are known to develop _____ from unfertilized eggs and are therefore haploid.
 - a) self-fertilization
 - b) haploid allele transfer
 - c) parthenogenetically
 - d) self-apomixis
- 8) The multiple effects of a single gene on the phenotype of an organism is called _____.
 - a) multiple phenotypic interaction
 - b) pleiotropy
 - c) epigenetic effects
 - d) epistasis
- 9) Sickle cell anemia is caused by _____.
 - a) Nonsense mutation
 - b) Silence mutation
 - c) Missense mutation
 - d) Frameshift mutation

- 10) Accurate mapping of genes can be done using _____.
a) Two point mapping b) Linkage map
c) Single gene mapping d) Three point mapping

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

- 1) Change of a single nucleotide is called as _____.
- 2) In Chinchilla fur colour, _____ Pigmentation is absent.
- 3) Crossing over is advantageous because it brings about _____.
- 4) The phenotypic ratio of a dihybrid cross is _____.
- 5) The cross between heterozygous F1 hybrid and _____ is known as the test cross.
- 6) Alleles are nothing but _____.

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

- 1) Explain Aneuploidy
- 2) What are sex limited genes?
- 3) What will be the phenotypic ratio when Purple coloured flowered plant (Pp) crossed with white coloured flowering plant (pp)
- 4) What is X-Y linkage?

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

- a) Describe the *E. coli* genome in brief.
- b) Describe the crossing over with suitable example.

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

- a) Explain the structural and numerical changes in chromosomes.
- b) Explain the structure of sex chromosomes and genetics of colorblindness.

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

- a) Describe the induced and spontaneous mutations.
- b) Describe the components of genetic counseling.

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

- a) Describe the nucleotide excision and mismatch repair mechanisms.
- b) Explain the sex limited and sex influenced genes.

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

- a) With suitable examples explain co-dominance and incomplete dominance.
- b) Explain various mutagenic agents and their action mechanism.

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**M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022
(GENETICS)**

Cellular and Molecular Biology

Day & Date: Thursday, 16-02-2023
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Choose correct alternatives (MCQ)

10

- 1) In eukaryotes tRNA is transcribed by _____.
 - a) RNA polymerase I
 - b) RNA polymerase II
 - c) RNA polymerase III
 - d) Poly A polymerase
- 2) During eukaryotic translation _____ codon identified as initiation codon.
 - a) UAA
 - b) AUG
 - c) UGA
 - d) UAG
- 3) In prokaryotes _____ is responsible for bacterial DNA replication.
 - a) DNA polymerase I
 - b) DNA polymerase II
 - c) DNA polymerase III
 - d) DNA polymerase IV
- 4) F-actin is polymer of _____.
 - a) Tubulin dimer
 - b) Globular actin
 - c) Albumin
 - d) Myosin
- 5) _____ proposed the Fluid mosaic model of plasma membrane
 - a) Watson & Crick
 - b) Singer & Nicolson
 - c) Temin & Baltimore
 - d) Jacob & Monad
- 6) _____ is an example of active transport.
 - a) Simple diffusion
 - b) Facilitated diffusion
 - c) Osmosis
 - d) Na-K ATPase pump
- 7) In prokaryotic transcription process promoter recognition is 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) _____ are known as secondary messenger molecule.
 - a) Ca^{++}
 - b) Mn^{+}
 - c) Cl
 - d) Fe^{+}
- 10) Cdk2/cyclinE functions in _____.
 - a) G₂/M transition
 - b) G₂
 - c) M
 - d) G₁/S transition

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

- 1) _____enzyme required for joining of Okazaki fragments during replication.
- 2) Dyenins are minus end directed motor proteins associated with _____.
- 3) _____ proposed Sandwich model of plasma membrane.
- 4) _____ enzymes required for aminoacylation of tRNA molecule.
- 5) _____ are known as Zonula occludes in animal cells.
- 6) _____ identified as universal transcription factor.

Q.2 Answer the following**16**

- a) Describe different types of RNA polymerases in eukaryotes.
- b) Write a note on Clover leaf model of tRNA.
- c) Explain structure and functions of myosin molecule.
- d) Write a note on hemi-desmosomes.

Q.3 Answer the following**16**

- a) Describe rolling circle model of replication.
- b) Describe mechanism of transcription in eukaryotes.

Q.4 Answer the following**16**

- a) Explain 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 types of active transport.

Q.6 Answer the following**16**

- a) Describe mechanism of protein synthesis in prokaryotes.
- b) Describe structure, assembly and functions of F-actin.

Q.7 Answer the following**16**

- a) Explain G-protein coupled signal transduction pathway.
- b) Write a essay on eukaryotic cell cycle

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**M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2022
(GENETICS)**

Cancer Genetics and Stem Cell Research

Day & Date: Monday, 20-02-2023
Time: 03:00 PM To 06:00 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) Choose correct alternative. (MCQ) 10

- 1) Normal cells have the ability to _____ when they become damaged or diseased.
 - a) self destruct
 - b) self proliferate
 - c) over populate
 - d) become malignant
- 2) _____ cells which lost their control of the regulated division, differentiation, and apoptosis.
 - a) Tumor cell
 - b) Immune cell
 - c) Platelets
 - d) Stem cells
- 3) _____ is the process through a malignant cell spread throughout normal region.
 - a) Transformation
 - b) Invasiveness
 - c) Apoptosis
 - d) Progression
- 4) _____ is the process of transition from normal cells to cancerous cells.
 - a) Ubiquitylation
 - b) Polymerization
 - c) Transformation
 - d) Metastasis
- 5) Which of the following mutation causes Burkitt's lymphoma?
 - a) Point mutation
 - b) Chromosomal translocation
 - c) Deletion
 - d) Duplication
- 6) The most common types of treatment of Cancer are _____.
 - a) Chemotherapy
 - b) Surgery
 - c) Radiation Therapy
 - d) All the above
- 7) Nerve cell is a type of _____ cell.
 - a) Unipotent
 - b) Pluripotent
 - c) Multipotent
 - d) Totipotent
- 8) _____ cells are the only cells which can develop into whole organism.
 - a) Pluripotent
 - b) Multipotent
 - c) Totipotent
 - d) Unipotent
- 9) In tissue engineering (TE) is using material-based porous _____ to provide physical support and a local environment for cells to enable and facilitate tissue development.
 - a) 3D scaffolds
 - b) 2D scaffolds
 - c) Suspension culture
 - d) Agar plate

- 10) BMP stands for _____.
- Bone morphology protein
 - Bone muscle protein
 - Bone Morphogenesis protein
 - Bone Makeup Protein

B) Fill in the blanks OR Write True/False. 06

- All tumor cells are malignant cells.
 - True
 - False
- Caspase 8 is an initiator caspase.
 - True
 - False
- Cancer is an inherited disease.
 - True
 - False
- Stem cell treatments are risk-free if they come from your own body.
 - True
 - False
- Renal stem cells are present in _____.
- Retinoblastoma is a cancer of the _____.

Q.2 Answer the following. 16

- Write short note on Cancer Vs Normal cell.
- Write short note on Hematopoietic stem cell.
- Add a note on Caspases.
- Write about structure of P⁵³ gene.

Q.3 Answer the following. 10

- Explain in detail processes of Angiogenesis with suitable diagram. 10
- Explain role of Epigenetic in cancer. 06

Q.4 Answer the following. 16

- Write a note on Metastasis.
- Explain different types of Tumor viruses.

Q.5 Answer the following. 10

- Explain in detail processes of apoptosis. 10
- Write a note on Chemotherapy on Cancer. 06

Q.6 Answer the following. 16

- Write a note on Stem Cells in Eye Diseases and Disorders.
- Add a note on Regeneration of Bone and Cartilage.

Q.7 Answer the following. 10

- Explain detail about Tissue Engineering and Transplantation Technique. 10
- Add a note on Extra Cellular Matrices. 06

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**M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2022
(GENETICS)**

Analytical Instruments and Techniques

Day & Date: Tuesday, 21-02-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Question 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) Choose correct alternative. (MCQ) 10

- 1) In _____ the stationary phase held in a narrow tube and the mobile phase is forced through it under pressure.
 - a) Column chromatography
 - b) Planar chromatography
 - c) Liquid chromatography
 - d) Gas chromatography
- 2) The greatest resolution in light microscopy can be obtained with _____.
 - a) Longest wavelength of visible light used
 - b) an objective with minimum numerical aperture
 - c) shortest wavelength of visible light used
 - d) shortest wavelength of visible light and an objective with the maximum numerical aperture
- 3) In Thin layer chromatography, the stationary phase is made of _____ and the mobile phase is made of _____.
 - a) Solid, liquid
 - b) Liquid, liquid
 - c) Liquid, gas
 - d) Solid, gas
- 4) NMR is the study of the absorption of _____ by nuclei in a magnetic field.
 - a) Radioactive radiation
 - b) IR radiation
 - c) Radio frequency radiation
 - d) Microwaves
- 5) In fluorescence microscopy, _____ performs the function of removing all light except the blue light.
 - a) Exciter filter
 - b) Barrier filter
 - c) Dichroic mirror
 - d) Mercury arc lamp
- 6) _____ is used to separate molecules based on affinity.
 - a) Column chromatography
 - b) Ion exchange chromatography
 - c) Thin layer chromatography
 - d) Affinity chromatography
- 7) If proteins are separated according to their electrophoretic mobility then the type of electrophoresis is _____.
 - a) SDS PAGE
 - b) Affinity Electrophoresis
 - c) Electro focusing
 - d) Free flow electrophoresis
- 8) Image formation in electron microscope is based on _____.
 - a) column length
 - b) electron number
 - c) differential scattering
 - d) specimen size

- 9) If the mobile phase is gas, movement of solute is determined by its ____.
- a) Boiling point
 - b) Melting point
 - c) Solubility
 - d) Volatility
- 10) The secondary electrons radiated back in scanning microscope is collected by ____.
- a) specimen
 - b) anode
 - c) vacuum chamber
 - d) cathode

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

- 1) In _____ state of matter mass spectroscopy is being performed.
- 2) Density gradient centrifugation uses _____ sugar.
- 3) Resolution of electron microscope is near _____.
- 4) In gas chromatography, _____ gas used as mobile phase is an inert gas.
- 5) For the separation of genetic material in density gradient centrifugation _____ is used as liquid density gradient.
- 6) In _____ spectroscopy, UV light excites electrons in molecules and emitted light is measured.

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

- a) What are Optical principles of Microscopy?
- b) Brief on Raman Spectroscopy.
- c) Write note on Liquid Scintillation counting.
- d) Describe in short Dot Blot technique.

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

- a) Discuss Phase contrast microscope with respect to: Principle, construction, working and applications.
- b) Discuss Scanning electron Microscope with respect to: Principle, construction, working and applications.

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

- a) Give the principle and applications of Infrared Spectroscopy.
- b) Explain methods of sample ionization in mass spectroscopy.

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

- a) Take detailed account on scintillation counters in biological sciences.
- b) Discuss the Principle and applications of Autoradiography.

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

- a) Describe principle and applications of SDS-PAGE.
- b) Explain in detail Western Blotting Technique and its applications.

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

- a) Explain principle, working and applications of Gas Liquid Chromatography.
- b) Principle, procedure and applications of High-Performance Liquid Chromatography.

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**M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov - 2022
(GENETICS)**

Research Methodology and Scientific Report Writing and IPR

Day & Date: Thursday, 23-02-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

- 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) Fill in the blanks by choosing correct alternatives given below. 10

- 1) Diagnostic research is _____.
 - a) To determine frequency with which something or with which it is associated with something.
 - b) To test hypothesis of causal relationship between variables
 - c) To gain familiarity with phenomenon or to achieve new insights in to it.
 - d) To portray accurately the characteristic of particular individual, situation or a group.
- 2) _____ of data is process of examining the collected raw data to detect errors and omissions and to correct these when possible.
 - a) Coding
 - b) Decoding
 - c) Classification
 - d) Editing
- 3) Chi-square test is often used to judge _____.
 - a) as a test of dependence
 - b) significance of population variance
 - c) heterogeneity
 - d) as a test of misfit with median ratio
- 4) Which is the most difficult step in report writing?
 - a) Logical analysis
 - b) Preparation of final outline
 - c) Rewriting and polishing of rough draft
 - d) Nil report writing is easy task
- 5) When conducting an ANOVA, F- DATA will always fall within what range?
 - a) Between 0 to infinity
 - b) Between 0 to 1
 - c) Between negative infinity and infinity
 - d) Between 1 to infinity
- 6) _____ is plagiarism checker.
 - a) Sound forge
 - b) grammarly
 - c) turnitin
 - d) fast pencil
- 7) Intellectual property rights aim is to protect ideas that of _____ value.
 - a) social
 - b) moral
 - c) commercial
 - d) ethical

Q.6 Answer the following

- a) Write a note on - Intellectual property rights in India. **10**
- b) Give details on criteria and procedure of patenting. **06**

Q.7 Answer the following

- a) Explaining: **10**
 - 1) Bio Piracy
 - 2) Breeders exemption
- b) Give an account of 'plant breeders rights'. **06**