

SEAT No. _____

[70]

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SARDAR PATEL UNIVERSITY
M.Sc. Genetics, Third Semester Examination
1st November 2017, Wednesday
2.00 to 5.00 pm
PS03CGEN01: Immunogenetics

Total Marks- 70

Note: i) Attempt all questions.
ii) Marks are indicated on the right hand side.

- Q.1 Answer the following Multiple Choice Questions. All are compulsory** **08**
1. The antigens present in blood are presented to B cells in
a. Lymph nodes b. spleen c. thymus d. MALT
 2. The following cell surface marker is used to identify Tc population
a. CD4 b. CD6 c. CD8 d. C9
 3. The major antibody class secreted in Peyer's patches is
a. IgA b. IgG c. IgE d. IgD
 4. C1 inhibitor blocks following pathway of complement activation
a. Classical b. Alternative c. lectin d. all of these
 5. The following interaction is not present between antigen and antibody molecule
a. Covalent bond b. hydrophobic interactions c. hydrogen bonds
d. ionic bond
 6. Luminex assay is done for
a. MHC matching b. minor antigen matching c. pre-existing antibodies
d. Blood group matching
 7. The nervous system is affected in the following autoimmune disease
a. Diabetes mellitus b. Grave's disease c. Multiple Sclerosis d. Rheumatoid arthritis
 8. In bare lymphocyte syndrome, specific defect is observed in
a. T cells b. B cells c. Neutrophils d. NK cells
- Q.2 Attempt Any Seven of the following:** **14**
1. Enlist important differences between humoral and adaptive immunity.
 2. What are germinal centers?
 3. How future protection is provided by adaptive immunity?
 4. What are the differences in antigen recognition by B and T cells?
 5. What is class switching?
 6. Explain types of ELISA.
 7. Mention characteristics of Myasthenia gravis.
 8. What are recombinant vaccines?
 9. How is attenuated vaccine produced?
- Q.3 A Give a detailed account of cells of myeloid lineage.** **06**
- Q.3 B Write a note on: lymph node as a secondary lymphoid organ.** **06**

OR

Q.3 B Explain the mechanism of killing by phagocytic cells. **06**

Q.4A Explain the sequence of events occurring during gene rearrangement in the variable region of heavy chain. **06**

Q.4B (i) Comment on polygenic and polymorphic nature of MHC genes. **06**
(ii) Explain the structure of class I and class II MHC molecules.

OR

Q.4B Describe the production of human monoclonal antibodies by phage display. **06**

Q.5 A Discuss the formation of C5 convertase during complement activation. **06**

Q.5 B Explain methods for determination of antibody affinity. **06**

OR

Q.5 B Explain "Memory and Specificity of graft rejection". **06**

Q.6A Discuss the establishment of tolerance for self antigens in body. **06**

Q.6 B Write a note on (i) Immunity to viral infections **OR** (ii) Primary Immunodeficiency **06**

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SARDAR PATEL UNIVERSITY**M. Sc. (Genetics) – Third Semester Examination (CBCS)****Friday, 3rd November, 2017****2:00 p.m. to 5:00 p.m.****PS03CGEN02: Human Molecular Genetics****Total Marks: 70**

- Note: (1) Figures to the right indicate marks.
 (2) Draw a neat and labeled diagram, wherever necessary.

Q. 1 Choose the most appropriate answer from the four alternatives given: [08]

- i. Which one of this describes a contig?
 - (a) Library of overlapping clones
 - (b) A complete mRNA library
 - (c) An ordered genomic library
 - (d) None of these
- ii. Linkage mapping can determine the distance between which of the following pairs of DNA sequences?
 - (a) Two known genes
 - (b) AFLPs and RFLPs
 - (c) Two AFLPs
 - (d) All of the above
- iii. Poly Q tract is a characteristic feature found in _____.
 - (a) Cystic fibrosis
 - (b) Huntington's chorea
 - (c) Phenylketonuria
 - (d) Hemophilia
- iv. Which one of the following is a temporary diabetes?
 - (a) IDDM
 - (b) Monogenic diabetes
 - (c) Diabetes incipidus
 - (d) Gestational diabetes
- v. Accumulation of branched chain amino acids in children causes _____.
 - (a) Cystic fibrosis
 - (b) DMD
 - (c) Phenylketonuria
 - (d) MSUD
- vi. Which one of the following MPS has 4 subtypes?
 - (a) Hurlers syndrome
 - (b) Sanfilippo syndrome
 - (c) Morquio syndrome
 - (d) Sly syndrome
- vii. Drug induced hemolytic anemia in African males are due to deficiency of _____.
 - (a) Glutathione Reductase
 - (b) NADPH
 - (c) G6PDH
 - (d) Glucose 6 Phosphatase
- viii. Which of the following is not a part of typical phase II conjugation reactions?
 - (a) Acetylation
 - (b) Hydroxylation
 - (c) Methylation
 - (d) Glucuronidation

Q.2 Answer any SEVEN from the following:

[14]

- i. Differentiate between genetic mapping and physical mapping.
- ii. Enlist various positional independent strategies.
- iii. Write functions of Htt protein.
- iv. Write examples of various epigenetic mechanisms.
- v. Enlist X linked lipidosis and mucopolysaccharidosis.

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- vi. Write two major types of albinism in humans.
- vii. Why early diagnosis of IEM is crucial?
- viii. Differentiate between pharmacogenetics and pharmacogenomics.
- ix. Name genes affecting warfarin metabolism.

- Q.3(a) Enlist various genetic markers. Discuss their importance in gene mapping. [6]
 (b) Describe pulse field gel electrophoresis. [6]

OR

- (b) 1. Explain synteny of genes. [3]
 2. Write a brief note on chromosome walking. [3]

- Q.4(a) What are basis for the classification of trinucleotide repeat expansion disorders? Describe Friedreich's ataxia. [6]
 (b) Justify that "obesity is a polygenic and multifactorial disease". [6]

OR

- (b) 1. Differentiate between hemophilia A, hemophilia B and hemophilia C. [3]
 2. Write brief note on neurofibromatosis. [3]

- Q.5(a) Describe molecular and biochemical aspects in PKU and alkaptonuria. [6]
 (b) Describe human mitochondrial syndromes. [6]

OR

- (b) Write short notes on the following:
 1. Glycogen storage disease type II [3]
 2. Gaucher disease [3]

- Q.6(a) Discuss practical implications of human genome projects. [6]
 (b) Discuss social and ethical issues in Medical genetics. [6]

OR

- (b) Explain SSCP and DGGE techniques for the scanning of genes for unknown mutation. [6]

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SARDAR PATEL UNIVERSITY
M.Sc. (Genetics) – Third Semester Examination
Tuesday, 7th November, 2017
02:00 P.M. to 05:00 P.M.
PS03CGEN03: Genetics in Crop Improvement

Total Marks: 70

- Note: (1) Figures to the right indicate marks.
(2) Draw a neat and labeled diagram, wherever necessary.

Q.1 Choose the most appropriate answer from the four alternatives given:

[08]

- (i). **Cytoplasmic male sterility defect is due to**
(a) Ethylene (b) Mitochondrial genome (c) Nuclear genome (d) None of them
- (ii). **Pedigree method for self pollinated crops is suitable for.....**
(a) Improving specific characteristics (b) Improving non specific characteristics
(c) Both (a) and (b) (d) None of these
- (iii). **Generally, with increase age of the donor plants the androgenic response.....**
(a) Increase (b) Decrease (c) No changes (d) None of these
- (iv). **..... was the first to isolate protoplast form plant cell.**
(a) James (1892) (b) Sharma (1892)
(c) Lindsey (1892) (d) Klercker (1892)
- (v). **The insect toxicity of BT resides in a**
(a) Ribosomes (b) Large protein (c) Lipids (d) Pyrenoids
- (vi). **Somaclonal variation term was introduced by.....**
(a) Smith and James (b) Bergmann (c) Sharma and Joshi (d) Larkin & Scowcroft
- (vii). **RAPD is**
(a) DNA sequencing based method (b) Restriction digestion based method
(c) PCR based method (d) All of these
- (viii). **Ideally distance between molecular marker and gene of interest or QTL is.....**
(a) <1cM (b) <75 cM
(c) <25 cM (d) <5 cM

Q.2 Answer any SEVEN from the following:

[14]

- (i). What do you mean by back cross method?
(ii). Write a short note on polyploidy.
(iii). Give a brief note on pure line selection in self pollinated crops.
(iv). Differentiate between anther culture and ovule culture.
(v). What do you mean by somatic hybridization?

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- (vi). Write any three factors influencing somaclonal variations.
- (vii). Write a short note on pathogenesis related proteins.
- (viii). What do mean by flavr savr tomato?
- (ix). Differentiate between AFLP and RAPD.

- Q.3** (a) Write a detail note on back cross method in self pollinated crops. [6]
- (b) Discuss in detail about importance of mutational breeding in crop improvement programmes. [6]

OR

- (b) What do you mean by male sterility in crops? Write various types of male sterility studied by you. [6]
- Q.4** (a) Write a detail note on methods for isolation of protoplast. [6]
- (b) Write a various applications of haploids and dihaploids in crop improvement. [6]

OR

- (b) Give a detail account on anther culture for haploids production. [6]
- Q.5** (a) Define somaclonal variation? Discuss with *in vitro* scheme used for obtaining somaclonal variations in crop improvement programs. [6]
- (b) Discuss various applications and disadvantages of somaclonal variation. [6]

OR

- (b) Discuss the various approaches used for production of insect resistant transgenic plants. [6]
- Q.6** (a) What do you mean by marker assisted selection? Write a detail note on nearly isogenic line (NIL) strategy in crop improvement programs. [6]
- (b) Explain the following: [6]
- (i) Improvement of starch and lipid quality in transgenic crops
 - (ii) Role of herbicide resistance in crop improvement program with suitable examples..

OR

- (b) Write a detail note on drought resistance in transgenic crops. [6]

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Q-2 Attempt ANY SEVEN from the following: (14)

1. Draw and label the parts of a sperm cell, and list the functions of each.
2. Write the basic steps of oogenesis.
3. Classify the stem cells based on potency with example.
4. Write about progeria.
5. What is endocrine disruptor? give examples.
6. Differentiate between cis and trans acting regulatory elements.
7. Enlist major classes of developmental anomalies.
8. Write names of any 2 transcription factors genes and their mutation phenotypes.
9. Differentiate between primary and secondary infertility.

- Q-3 (a) Discuss the types of cleavage patterns and the role played the yolk on cleavage. (06)
(b) Describe the process of fertilization and add a note on prevention of polyspermy. (06)

OR

- (b) Write short note on followings: (03)
1) Development of human brain (03)
2) Cell movements during Gastrulation

- Q-4 (a) Explain the mechanisms for conversion of proto-oncogenes into oncogenes. (06)
(b) How tumor suppressor genes lead to cancer? Explain with a suitable example. (06)

OR

- (b) Explain alcohol and retinoic acid as teratogens. (06)

- Q-5 (a) Describe cell to cell contact strategy for gene expression during development. (06)
(b) Enlist techniques determining the functions of genes during development and Explain gene knock-out and anti-sense RNA techniques for the same. (06)

OR

- (b) Explain muscle differentiation in Sea squirt embryo by localized m-RNA. (06)

- Q-6 (a) Discuss various syndromes associated with human sex chromosomal aberrations. (06)
(b) Give a detailed account on infertility. (06)

OR

- (b) 1. Explain positional cloning technique for identification of genes associated with human developmental anomalies. (03)
2. Write a note on phenotypic heterogeneity. (03)

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