SEAT No._____

[27]

SARDAR PATEL UNIVERSITY
M.Sc (IV Semester) Examination (CBCS)
Friday, 13th April, 2018
10:00 a.m. to 1:00 pm
Biochemistry
PS04CBIC01 – Animal Biotechnology

No. of Printed Pages : 2

TOTAL MARKS: 70

Q.1 Tick mark / select the correct answer for the following. (*Only correct option against given question number needs to be written in provided answer book*) **(08 Marks)**

1. The predominant amino acids of collagen are
   a. Glycine – Proline
   b. Lysine - Cysteine
   c. Valine - Glutamic acid
   d. Hydroxyproline - Glutamic acid

2. Which of the following is a cell line from spleen?
   a. WEHI
   b. CacO
   c. Friend
   d. HaCaT

3. Which enzyme marker is suitable for the characterization of macrophages?
   a. Proline hydroxylase
   b. Non specific esterase
   c. Glutamyl synthetase
   d. Angiotensin converting enzyme.

4. The predominant signaling observed in malignantly transformed cells is
   a. Endocrine
   b. Paracrine
   c. Autocrine
   d. Juxtacrine

5. pH 4 i.e. acidic pH, phenol red indicator turns:
   a. Yellow
   b. Purle
   c. Pink
   d. White

6. Which one of the following is the firstly established continuous human cell line
   a. Vero
   b. A 549
   c. HeLa
   d. MCF-7

7. Which of the following cells are independent to senescence?
   a. Germ cells
   b. Stem Cells
   c. Transformed Cells
   d. all of above

8. The role of glucose in cell culture media is:
   a. Source of nitrogen
   b. Source of energy, carbon
   c. Adjusts osmotic pressure
   d. Growth stimulator

[P.T.O.]

Q.2 Answer **any seven** from the following: 14

a) State two points of difference between anchorage dependent and anchorage independent cells

b) Define the term 'differentiation'. List the main parameters that control differentiation?

c) Which parameters are checked to study viability assay during the use of cell lines for toxicological study? Write the importance of this assay.

d) Name any two energy sources suitable to use in media and write their advantages and disadvantages.

e) Name the cytoskeleton, adaptor protein and linker adhesive protein involved in the construction of adherent junctions and desmosomes.

f) Briefly discuss the types of air filters used in Laminar Flow Cabinet

g) Explain the importance of matrigel as well as feeder layer and write their importance in cell culture

h) Which parameters indicate the need for the change of media during sub-culture?

i) State the role of role of CO_2 incubator in animal tissue culture.

Q.3 (A) Describe the molecular organization and dynamics of cytoskeleton components. 6

(B) Give an account of different molecules involved in cell-cell adhesion and cell-matrix adhesion in animal tissues; and write their significance during cell culture. 6

OR

(B) Discuss the use of physiological and non-physiological factors to induce differentiation in cell line. 6

Q.4 (A) Discuss the importance and composition of serum free media. 6

(B) Describe the protocol for the development of primary culture from any embryonic tissues using mechanical disaggregation and explant methods. 6

OR

(B) Enlist any two media used in animal cell culture. Describe the different physicochemical properties of media. 6

Q.5 (A) How DNA and chromosomes can be used for the characterization of cells? Discuss in detail. 6

(B) Write the characteristics of transformed cells and describe the methods for inducing immortalization in cultured cells. 6

OR

(B) Enlist the various cell separation methods and briefly describe the cell separation techniques based on cell density and cell size. 6

Q.6 (A) Describe the detailed culture protocol of <u>any one</u> of the following cells. (i) Hepatocytes (ii) keratinocytes (iii) Mesenchymal cells 6

(B) Define adult stem cells and embryonic stem cells with suitable examples; and write their applications. 6

OR

(B) Write short notes on: (i) Methodology for the construction of transgenic animals <u>OR</u> (ii) Embryo technology 6

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[22]

M.Sc. IVth semester Biochemistry Examination

Wednesday, 11th April, 2018

Time: 10.00 a.m. to 1.00 p.m.

PS 04 C BIC 02 Nutritional and Clinical Biochemistry

Max marks: 70

Q.1 Choose the most correct options for the following questions. (08 marks)

1. If the liver contains 100 grams of carbohydrates, this represents
   (a) 400 calories (b) 100 Kcal (c) obese (d) 400 Kcal

2. Lipids are digested and absorbed much _____ than carbohydrates
   (a) slower (b) faster (c) earlier (d) all above are true

3. Plasma glucose concentration doesn't reduce further to 3.5 mM/L in prolonged starvation because
   (a) glycolysis is inhibited in the surrounding tissues (c) glycolysis is never inhibited
   (b) glucose transport is inhibited (d) none of the above

4. Diabetes specific microvascular diseases is a leading cause of
   (a) Blindness (b) Renal failure (c) nerve damage (d) all of the above

5. Which of the following is involved in regulation of water metabolism
   (a) Aldosterone (b) thirst centre in brain (c) ADH (d) all of the above

6. _____is a numerical system of measuring the degree of rise in blood sugar in response to various carbohydrates taken in diet.
   (a) Glycemic Index (b) IGT (c) Threshold value (d) Carbohydrate index

7. Receptors for chylomicron remnant are
   (a) Apo A specific (b) Apo B-48 specific (c) Apo C specific (d) Apo E specific

8. Insulin activates _____ enzyme to transform excess carbohydrate in the diet to get converted into fat
   (a) Acetyl Co-A ACP transferase (c) Malonyl Co-A ACP transferase
   (b) Acetyl- Co-A carboxylase (d) none of the above

[P.T.O.]

Q.2 Answer **any seven** of the following questions in brief: (14 marks)

1. What is an average daily energy requirement of a moderately active adult male and female?
2. What will be the energy value of 2gm of wheat when combusted in bomb calorimeter. raised the temperature of 3kg of water from 23° C to 26° C. The water equivalent of calorimeter was about 500gm.
3. What is Respiratory quotient? Write R.Q. of body at post absorptive state.
4. Which lipoprotein is lower in the serum of an obese?
5. Name the sites of biosynthesis of LDL, VLDL, HDL and Chylomicrons.
6. List four hypothesis explaining chronic diabetes-specific complications.
7. Which enzyme is deficient in Phenylketonuria?
8. Which lipoprotein is responsible for causing Ischaemic Heart Disease?
9. Distinguish between normal Glucose Tolerance (NGT) and Impaired Glucose Tolerance (IGT).

Q3(a) What is the energy value of food? Differentiate between physiological energy value and energy value obtained using bomb calorimeter. (06)

(b) What is Insulin Resistance? Describe how Insulin Resistance develops into Diabetes mellitus. (06)

OR

(b) What is Polyol pathway? What are its detrimental effects? (06)

Q4 (a) Explain three major methods to evaluate nutritional quality of proteins – PER, NPU and NPR. (06)

(b) Explain the metabolic adaptation in prolonged starvation. (06)

OR

(b) Explain protein-energy malnutrition. (06)

Q5 (a) Describe the metabolic fate of Chylomicrons and VLDL from blood. (06)

(b) Explain the causes and mechanism of development of obesity. (06)

OR

(b) What are essential fatty acids? Discuss their physiological functions. (06)

Q6 (a) Explain regulation of water metabolism in the body. (06)

(b) Describe any two methods of food preservation. (06)

OR

(b) Describe loss of vitamins during food processing. (06)

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[38] SARDAR PATEL UNIVERSITY
M.Sc. (IV Semester- CBCS) Examination
Subject: Biochemistry
PS04EBIC01; Plant Biotechnology
Monday, April 9, 2018
Time: 10.00 a.m. to 1.00 p.m.

Total Marks: 70

Note: Figures in brackets indicate marks
Answer all the questions in the given answer book

Q1. Choose the appropriate answer for the following multiple choice questions: (8x1=8)

i) Callus induction in monocots occur due to the presence of _____ in nutrient medium
(a) High conc. of Auxins (b) High concentration of reduced nitrogen
(c) both (a) & (b) (d) Low concentration of auxin and reduced nitrogen

ii) Which chemical treatment is most effective and widely used for obtaining diploid plants from *in vitro* raised haploid plants?
(a) Colchicine (b) Fluorodioxyuridine
(c) Nitrous oxide (d) Naphthalene acetic acid

iii) Embryo culture is used for .....
(a) Establishing embryonic cell suspension
(b) Recovery of interspecific hybrid embryo
(c) Somatic hybridization
(d) Haploid embryo production

iv) Secondary metabolites production is possible by the use of.....
(a) Protoplast cultures (b) Meristem tip cultures
(c) Nodal cultures (d) Cell suspension cultures

v) One of the major advantages of protoplast fusion is that
(a) It overcomes breeding barriers
(b) allows transfer of unwanted genes of the donor
(c) allows transfer of unwanted genes of the recipient
(d) requires molecular markers

vi) The metabolic pathway introduced in "Golden rice" is to synthesize
(a) Vitamin B (b) Flavanoids
(c) Beta carotene (d) Xanthophylls

vii) Biolistics is a process in which
(a) DNA coated microprojectiles are allowed to pierce host cells
(b) DNA is directly injected into the host cells by a microcapillary
(c) Two protoplasts are fused
(d) A voltage is applied on host cells

viii) A scientist has developed a novel vector for cloning. Which of the following is highly suited to protect this intellectual property?
(a) Trade mark (b) Copy right
(c) Patent (d) trade secret

CP.T.O.)

Q2. Answer any SEVEN of the following in brief: (7x2=14)

(a) Differentiate between Organogenesis and embryogenesis

(b) Differentiate zygotic embryo and somatic embryo

(c) Differentiate Normal seed and synthetic seed

(d) Depict frequency of somaclonal variation in various culture systems schematically.

(e) T4 DNA ligase

(f) Binary vectors

(g) Recombinant Inbred Lines (RILs)

(h) Preformed defense in plants

(i) Trips

Q3. (a) How various tissue culture systems can be used in crop improvement? Discuss the applications of each culture system. (6)

(b) Write notes on zygotic embryo cultures and their applications with suitable examples (6)

OR

(b) Discuss the different steps of micropropagation by using the various culture systems studied by you. (6)

Q4 Write notes on: (6)

(a) Methods for Protoplast isolation from leaf explant and its regeneration.

(b) Strategies for *In vitro* Germplasm conservation (6)

OR

(b) Write notes on in vitro production of secondary metabolites. (6)

Q5 (a) Outline the mechanism of T-DNA transfer by *Agrobacterium tumefaciens*. (6)

(b) Explain the principle, advantages and limitations of particle bombardment (6)

OR

(b) Write a comparative account of NILs and RILs (6)

Q6 (a) List the different methods of induced resistance in plants. Write in detail on Hypersensitive Response. (6)

(b) Explain the cellular signalling events during plant defense against pathogens (6)

OR

b) Write a note on intellectual property rights. (6)

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SARDAR PATEL UNIVERSITY
M.Sc.(IV Semester) Biochemistry External Examinations
26th March, 2019 (Tuesday)
10.00 a.m. To 1.00 p.m.
Paper: PS04EBIC24 - Plant Biotechnology

I. Choose the most appropriate answer: **(8 marks)**

(i) The process in which new meristems arise from callus under *in vitro* conditions is known as:
(a) Differentiation (b) Redifferentiation
(c) Dedifferentiation (d) None of these

(ii) Mature zygotic embryos require high concentration of sucrose whereas young embryos require low concentration of sucrose in nutrient medium due to their
(a) Heterotrophic in nature
(b) Autotrophic in nature
(c) Hetrotrophic and autotrophic in nature
(d) Autotrophic and heterotrophic in nature

(iii) Anther cultures are used to produce
a) Homozygous plants b) Heterozygous plants
c) Double Haploids plants d) Both a and b

(iv) Among different culture systems used to generate *in vitro* plants which culture system shows the maximum frequency of somaclonal variation:
(a) Zygotic embryo cultures (b) Organ cultures
(c) Protoplast cultures (d) Meristem tip cultures

(v) Which of the following plasmids induces hairy roots in plants?
a) Ti plasmid b) Ri plasmid
c) pUC plasmid d) pBR 322 plasmid

(vi) Golden rice consists of _____ which is absent in normal rice
a) Phenols b) vitamins c) Beta carotene d) flavanoids

(vii) The GFP protein can be used as a tag as well as a reporter since
a) It is a non analyte c) it is non toxic
b) It does not require a substrate d) all of these properties

(viii) Marker Assisted Selection is advantageous over conventional breeding in terms of
a) Less time b) absence of unwanted gene transfer
c) Cost effectiveness d) All of these

II. Answer briefly on any seven **(14 marks)**

(i) Criteria for selection of explant/s for culture initiation

(ii) Distinguish between Somatic embryo and zygotic embryo

(P.T.O.)

(iii) Types of In vitro morphogenesis

(iv) Why cultured anthers will permit pollen to develop into pollen embryos where as cultured isolated pollen grains may not form embryos? Give reasons.

(v) Why *in vitro* developed plantlets have high mortality when transferred to soil than *in vivo* developed seedlings. Give reasons.

(vi) Define induced defense mechanism

(vii) Type II restriction enzymes

(viii) Co integrative vectors

(ix) PR proteins

Q1. (A) Identify the various tissue culture systems based on in vitro growth and development. Give briefly the applications of each culture system. **(6)**

(B) Differentiate between Macropropagation and Micropropagation. Write notes on micropropagation. **(6)**

OR

(B) Write notes on somatic embryogenesis and it's in vitro applications **(6)**

2. (A) Write notes on androgenesis and factors affecting the anther cultures **(6)**

(B) Write notes on meristem tip cultures and its use in production of disease free plants **(6)**

OR

(B) Write notes on *In vitro* production of secondary metabolites **(6)**

3. (A) Write the procedure for isolation and fusion of Protoplasts. **(6)**

(B) List the different methods for gene transfer in plants. Explain any one method in detail. **(6)**

OR

(B) Write briefly on the principle and applications of Marker Assisted Selection **(6)**

4. (A) Write a note on morphological, structural and chemical barriers in plants against pathogens. **(6)**

(B) Define Intellectual Property Rights (IPR). Explain the significance of patents in plant Biotechnology. **(6)**

OR

(B) Describe the role of Resistance (R) genes in plant defense in detail **(6)**

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No. of pages: 2

SARDAR PATEL UNIVERSITY
M. Sc. (IV Semester) Examination
Saturday, 23rd March, 2019
10:00 a.m. to 01:00 p.m.
Biochemistry
PS04EBIC23 – Microbial Physiology

Total marks: 70

Q.1 Select the right/most appropriate answer for the following: (08 marks)

A. Penicillin interfere with bacterial cell-wall synthesis by inhibiting
   a. Alanine racemase
   b. DD-transpeptidase
   c. UMP kinase
   d. Pyrophosphatase

B. _____ is the unique component of the core region of lipopolysaccharide of most gram-negative organisms.
   a. D-glucosamine
   b. Teichoic acids
   c. 2-keto-3-deoxyoctulosoninc acid
   d. β-hydroxy myristic acid

C. Which of the following flagellar protein is involved in conducting protons across the cytoplasmic membrane?
   a. Fli G
   b. Fli M
   c. Fli N
   d. Mot A/Mot B

D. Which of the following enzyme protect aerobic organisms from toxicity of ROS?
   a. Superoxide dismutase
   b. Catalase
   c. NADH oxidase
   d. Both a and b

E. Which of the following shows swarming motility?
   a. *Caulobacter*
   b. *Spirochetes*
   c. *E. coli*
   d. None of the above

F. Which of the following is true for Methylotrophs?
   a. Autotrophs
   b. Photoautotrophs
   c. Heterotrophs
   d. Lithotrophs

G. Enterobactin is which types of siderophores?
   a. Catecholate
   b. Hydroxamates
   c. Carboxylate
   d. None of the above

H. Which of the following quorum sensing circuit is found in *Staphylococcus aureus?*
   a. Com
   b. Agr
   c. CSF
   d. Cqs

(P.T.O)

Q.2 Answer/attempt **any seven** from the following: (14 marks)

a) What is two-partner protein secretion system?
b) Write in brief on ABC transporter.
c) What is the function and composition of spore coat?
d) Write in brief about significance of siderophore production.
e) Define: Symbiosis and Commensalism.
f) Differentiate between Bacteriocin and Antibiotic.
g) What are the characteristics of microbial reserve compounds?
h) Enlist the microorganisms used in MFC.
i) Write a brief note on phosphate assimilation in *E. coli*.

Q.3 A. Explain the molecular mechanism of chemotaxis in detail. (06 marks)
B. Explain Peptidoglycan biosynthesis. (06 marks)

OR

B. Describe the general mechanism of insertion of integral membrane proteins and export of periplamic proteins. (06 marks)

Q.4 A. Describe the physiological events leading to *E. coli* cell division. (06 marks)
B. Discuss in detail on EnvZ/OmpR two-component system. (06 marks)

OR

B. Explain the yeast cell cycle regulation in detail. (06 marks)

Q.5 A. Discuss in detail on protein synthesis inhibiting antibiotics. (06 marks)
B. Discuss the steps of biofilm formation and its control strategy. (06 marks)

OR

B. Write a note on biochemistry of bioluminescence. (06 marks)

Q.6 A. Describe in detail on A-B toxin with suitable example. (06 marks)
B. Discuss quorum sensing mechanism in Gram-negative bacteria with one suitable example. (06 marks)

OR

B. Write a note on Microbial hydrogen production. (06 marks)