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SARDAR PATEL UNIVERSITY
M Sc IV Semester Examination
Date: 25-04-2015 Day: Saturday
Time: 10.30 AM To 1.30 PM
Subject: BIOCHEMISTRY
Paper: PS04CBIC01 – Animal Biotechnology
Marks: 70

Q1. Select appropriate answers for the following. (8M)

(i) Which of the following is an endothelial mitogen?
(a) b FGF (b) Erythropoietin (c) Angiogenin (d) KGF

(ii) At pH 4, phenol red indicator turns
(a) Yellow (b) Purple (c) Pink (d) White

(iii) The appropriate marker for the characterization of enterocytes is
(a) Tyrosinase (b) Proline hydroxylase (c) Creatine kinase (d) ALK P

(iv) A cell with very slow turnover is
(a) Blood vessel endothelia (b) Keratinocytes (c) Enterocytes (d) Blood cells

(v) The cell line that can be disaggregated very easily is
(a) Epidermal (b) Endothelia (c) Mesenchymal (d) Hepatocyte

(vi) Which of the following are the metabolic products of glucose and glutamine?
(a) CO_2 and NH_3 (b) CO_2 and lactate (c) Lactate and ammonium (d) Lactate only

(vii) The chromosome proteins are partially digested by crude trypsin, producing a banded appearance on subsequent staining in
(a) G banding (b) C bending (c) Q banding (d) R banding

(viii) Growth medium used for culture of rat hepatocytes is
(a) L-15 Leibovitz (b) DMEM (c) Ham's F-12 medium (d) RPMI-1640

(PTO)

Q2. Answer any Seven from the following. (14 M)

(i) Explain the terms : Split ratio and Terminal differentiation.
(ii) How immortalization of a cell line can be developed using viral genes?
(iii) Briefly explain antibody based cell separation techniques.
(iv) What is a conditioned medium? Write its significance in cell culture.
(v) Why is microtitration assay considered suitable for toxicological studies?
(vi)State various parameters that control differentiation.
(vii) What is malignancy? Explain.
(viii) What is focal adhesion? Explain.
(ix) What are the basic differences between embryonic stem cells and adult stem cells?

Q3. (a) Write a brief note on the basic requirements for a cell culture laboratory. (6M)
(b) What is primary culture? Describe in brief enzymatic disaggregation in primary culture. (6M)

OR

(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. (6M)

Q4. (a) Give an overview on various signal transduction pathways that help to maintain stem cells and prevent their differentiation. Also add a note on any three therapeutic applications of stem cells. (6M)
(b) Why cell lines are considered a good model for the toxicological studies? Discuss different applications of cytotoxicity assays using cell lines. (6M)

OR

(b) Discuss how cells can be characterized based on DNA content and chromosomal analysis. (6M)

Q5. (a)Describe the culture of any one epithelial cell. Write its characterization during culture and discuss its applications. (6M)
(b) State different types of serum used in complete media. Give the details of major contents of serum and discuss importance of serum for animal cell culture. (6M)

OR

(b) Write a note on transgenic animals and discuss their applications. (6M)

Q6. (a) Answer the following in the context of monolayer culture. (6M)
(i) Under which conditions subculture of a primary culture is required?
(ii) Discuss the protocol for subculture of a primary culture.
(b) Write a note on conditions that improve the clonal growth. (6M)

OR

(b) Enumerate various assays to study cell viability and cell apoptosis; and explain in detail the experimental techniques to study apoptosis. (6M)

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SARDAR PATEL UNIVERSITY

M. Sc. Semester- IV (Under CBCS) Examination – BIOCHEMISTRY

Thursday, 23rd April 2015

Time- 10:30am to 1:30pm

PS04CBIC02 Nutritional & Clinical Biochemistry

Marks: 70

Q.1 **Mark the right answer of following questions.** **[08]**

1. A calorie is the amount of energy necessary to raise the temperature of one gram of _____ by one degree _____.
   - **a.** Water, Fahrenheit
   - **b.** Water, Centigrade
   - **c.** Oil, Fahrenheit
   - **d.** Oil, Centigrade

2. What will be calorific value of a mix diet containing 15g of carbohydrates and 5 g of proteins, which upon burning in bomb calorimeter, raises the temperature of 5000g of water by 2 °C. The water equivalent of the calorimeter is 500 g.
   - **a.** 1.1 Kcal
   - **b.** 11 Kcal
   - **c.** 11,000 Kcal
   - **d.** 110000 calories

3. Lipids are digested and absorbed much _____ than carbohydrates.
   - **a.** Slower
   - **b.** Faster
   - **c.** Earlier
   - **d.** All of the above

4. A mild heat treatment that primarily destroys enzymes and reduces microbial load is called-
   - **a.** Pasteurization
   - **b.** Blanching
   - **c.** Sterilization
   - **d.** Commercial sterilization

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. Increased fatty acid oxidation is a characteristic of-
   - **a.** Starvation
   - **b.** Diabetes mellitus
   - **c.** Hypoglycaemia
   - **d.** All of the above

7. Which hormone regulates the blood glucose concentration?
   - **a.** Adrenaline
   - **b.** Glucocorticoids
   - **c.** Insulin
   - **d.** All of the above

8. Alcohol consumption can lead to fatty liver condition because
   - **a.** Alcohol is converted into fat
   - **b.** Alcohol activates fatty acid transport
   - **c.** Alcohol changes [NADH]/[NAD+] ratio
   - **d.** None of the above

Q.2 Answer the following questions. (ANY SEVEN OUT OF NINE) **[14]**

1. What is RDA? What is the RDA for energy requirement of moderate men and women?
2. Write the advantages of starch as a source of carbohydrates.
3. What is Glycaemic index? What is the effect of fibrous food on glycaemic index?
4. What is biological value of protein? How is it measured?
5. How will you differentiate between starvation and undernutrition?
6. Justify- "Fats burn in the flame of carbohydrates".
7. What are PUFA and MUFA recommended in the diet of obese and diabetic persons?
8. Define hypokalaemia and hyperkalaemia.
9. Enlist the factors regulating blood sugar level.

Q.3 **a.** List the various method and instruments used for the determination of energy value of food. Explain any one in detail. **[06]**

b. Write a short note on: (i) Glycogen storage level **[06]**
(ii) Factors affect blood metabolic rate.

OR

b. Write down the changes in carbohydrate, fat & protein metabolism in *Diabetes mellitus* **[06]**

Q.4 **a.** Write a note on Kwashiorkor. **[06]**

b. What is glycosuria? Explain in detail about the occurrence of glycosuria in different conditions. **[06]**

OR

b. What is polyol pathway? How does it cause diabetes specific complications? **[06]**

Q.5 **a.** Explain the causes and mechanism of development of obesity. **[06]**

b. Explain the effect of various hormones on activation of lipase. **[06]**

OR

b. What are the four major groups of lipoproteins? Describe the metabolic fate of Chylomicrons & VLDL from blood. **[06]**

Q.6 **a.** Describe the factors regulating water in the body. **[06]**

b. Explain the futile cycle of fat between adipose tissue and liver. **[06]**

OR

b. What are electrolytes? Explain the role of hormones in maintaining electrolyte balance. **[06]**

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No. of Printed Pages: 02

(A-28) **SARDAR PATEL UNIVERSITY**

M.Sc. (IV Sem.) Examination

Tuesday, 21th April 2015

10:30 am – 01:30 pm

Biochemistry PS04EBIC01 – Microbial Physiology

Total Marks: 70

Note: Figures to the right indicate full marks.

Q.1 **Select proper option from following** **[08]**

1. Which of the following protein present in outer membrane shows protease activity?
   a. Tol A
   b. Omp T
   c. Ton A
   d. Omp C
2. The following is the example of siderophore produce by yeast.
   a. Yeastophore
   b. Saccharamycin
   c. Rhodotorulic acid
   d. Enterochelin
3. Which of the following act as a substrate in bacterial bioluminescence?
   a. $FMNH_2$
   b. ATP
   c. GTP
   d. DTT
4. Complex communities of microorganism attached to surface are known as
   a. Biofilms
   b. Both the above
   c. Flagella
   d. None of the above
5. Techoic acid are not found in:
   a. *Bacillus subtilis*
   b. *Staphylococcus aureus*
   c. *Lactobacillus plantarum*
   d. *Escherichia coil*
6. Which is the target site for binding of cholera toxin in host cell
   a. 28S RNA
   b. GSα
   c. Elongation factor-2
   d. Actin
7. Which of the following is an example of neurotoxin?
   a. Botulinum Toxin
   b. Both a & b
   c. Tetanus Toxin
   d. None of above
8. The following is the end product in cathodic chamber of MFC
   a. Water
   b. Carbon dioxide
   c. Ammonia
   d. ATP

Q.2 **Attempt/Answer (in Short) any seven from the following** **[14]**

1. Describe the structure of gram Negative cell wall in brief.
2. What is Heat Shock Protein?
3. What is the mode of action of streptomycin?
4. Which organisms are useful in MFC?
5. How the bacterial spores get resistance to ultraviolet radiation?
6. Give the role and types of cyclins in yeast cell cycle regulation.
7. Explain in brief about the stages of Biofilms formation.

8. What is Osmoprotectant?

9. Give the importance of siderophore production in PGPR.

Q.3 **A.** Explain the molecular mechanism of chemotaxis in *E.coli.* **[6]**

B. Give an account on: Peptidoglycan Biosynthesis **[6]**

OR

B. Discuss the structure and synthesis of bacterial flagella in detail. **[6]**

Q.4 **A.** Write down the role and regulation of sigma factors activity during bacterial sporulation. **[6]**

B. Explain the various stages and events leading to cell division in *E.coli.* **[6]**

OR

B. Give an account on yeast cell budding with the role of septins and spindle pole body in detail.

Q.5 **A.** Explain the importance and biochemical reaction of bacterial bioluminescence. **[6]**

B. Discuss the biochemistry and regulation of PHA synthesis. **[6]**

OR

B. How *E.coli* cell will respond under high osmotic stress? Give a detailed mechanism of it. **[6]**

Q.6 **A.** What is quorum sensing? Give the mechanism and importance of quorum sensing. **[6]**

B. Give an account on : Application of Bacteriocins **[6]**

OR

B. What are AB toxins? Explain the mechanism of cholera and diphtheria toxin **[6]**

======= Best of Luck ==========

No. Of Printed Pages: 2

[63] SARDAR PATEL UNIVERSITY
M.Sc. (IV Semester- CBCS) Examination
Subject: Biochemistry
PS04EBIC02; Plant Biotechnology
Saturday; 02/04/2015
Time: 2.30 p.m. to 5.30 p.m.

Total Marks: 7

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) What is the general photoperiod used for various culture systems
a) 24 hr light regime b) 12:12 hr Light: dark regime
c) 16:8 hr Light :dark regime d) 8:16 hr light : dark regime

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) Production of dihaploids is possible through:
(a) Zygotic embryo cultures (b) Anther cultures
(c) Callus cultures (d) Meristem tip cultures

iv) Which explants are generally used to obtain disease free plants?
(a) Internode (b) shoot tip (c) Anther (d) leaf

v) Which of the following methods is suitable for the production of random sized DNA fragments for cloning?
(a) Ultrasonication b) Needle c) homogenizer d) all of these

vi) 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

vii) *Agrobacterium tumifaciens* is often used to transform plant cells. The T-DNA of *Agrobacterium* in plant cells is found in the form of
(a) An autonomously replicating plasmid
(b) a mitochondrial plasmid
(c) A chloroplast plasmid
(d) integrated into the plant genome

viii) Which of the following is NOT patentable?
a) A novel process for protein purification
b) A new vector for cloning
c) A new drug molecule
d) a surgical procedure

Q2. Answer <u>any SEVEN</u> of the following in brief: (7x2=

(a) Types of in vitro growth
(b) Synthetic seed
(c) Which in vitro culture system show maximum somaclonal variation? Give reasons.
(d) Nurse culture technique
(e) Biotransformation
(f) Co-integrative vectors
(g) Functions of vir D1 and vir D2
(h) Near Isogenic Lines
(i) Crt 1 gene and its role in Golden rice

Q3. (a) Explain the role of auxin and cytokinin for in vitro growth and development.

(b) Discuss the *In vitro* morphogenetic potential of cell, tissue or organs for *in vitro* morphogenesis. What are the different pathways of in vitro morphogenesis?

OR

(b) Explain the different stages of micropropagation in brief.

Q4 (a) Write a note on anther cultures and their importance in agriculture

(b) Describe the method for isolation of protoplasts stepwise from leaf explants.

OR

(b) Write note on strategies for in vitro germplasm storage.

Q5 (a) Describe the role of linkers and adopters in ligation of DNA in detail.

(b) Write a note on in vitro production of secondary metabolites.

OR

(b) Describe the methods for obtaining the somatic hybrids and any one method for their selection.

Q6 (a) Explain how Marker Assisted Selection is useful in crop improvement?

(b) Explain the mechanism of T-DNA integration in plant chromosome from the Ti plasmid.

OR

(b) Discuss the various issues associated with BT brinjal. Why such issues are not raised against BT cotton?

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[A-21] No. of Printed Pages: 2

SARDAR PATEL UNIVERSITY
M.Sc (IV Semester) Examinations
Date: 28th April, (Tuesday), 2015.
Time: 10.30 am to 1.30 pm
Paper: PS04EBIC04- Plant Biotechnology

Total marks: 70

Choose the most appropriate answer: **(8x1= 8 marks)**

i) The chemicals ascorbic acid, citric acid or polyvinyl pyrrolidine are used either alone or in combination along with nutrient medium to reduce _____ from explants.
(a) Phenolic substances (b) fungal and bacterial growth
(c) secondary metabolites (d) callus formation

ii) Which stage of the microspores is selected for anther cultures:
(a) Microspore tetrad stage (b) Uninucleate microspore stage
(c) Binucleate microspore stage (d) Microspore mother cell stage

iii) The phenomenon of callus formation is called as...
a. Differentiation c. Redifferentiation.
b. Dedifferentiation d. All.

iv) _____are synthesized in plants, but not utilized by the plants for growth and development. However helps in plant protection and has economic value.
(a) Secondary metabolites (b) Primary metabolites
(c) Both (a) & (b) (c) Growth hormones

v) The GFP reporter system is advantageous over other systems since
(a) it is a standalone system (c) it is non toxic
(b) expressed in prokaryotic and eukaryotic cells (d) all of these

vi) *Agrobacterium tumifaciens* is often used to transform plant cells. The T-DNA of *Agrobacterium* in plant cells is found in the form of
(a) An autonomously replicating plasmid (c) a mitochondrial plasmid
(b) A chloroplast plasmid (d) integrated into the plant genome

vii) Resistance to the herbicide glyphosphate in transgenic plants is obtained by
(a) Overexpression of ESPS synthase gene (c) cloning a mutant pyruvate synthase gene
(b) Overexpression of shikimic acid (d) overexpression of aromatic amino acids

viii) Induced resistance in plants against pathogens is a
(a) Energy requiring mechanism (c) both (a) and (b)
(b) gene mediated response (d) none of these

II. Write short notes on *any seven*: **(7x2= marks)**

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

(b) Why *in vitro* developed plantlets need hardening before transfer to soil? Give reasons.

(c) Protoplast fusion products

(d) *In vitro* Androgenesis

(e) Role of elicitors in plant defence

(f) Advantages of somaclonal variations

(g) Role of vir D1 and D2 in *Agrobacterium* mediated transformation

(h) Bulked Segregation Analysis

(i) Two important properties of Systemic Acquired Resistance (SAR)

III. Answer the following: **(4x12 = 48 marks)**

i) a) How various tissue culture systems can be used in crop improvement? Discuss the applications and limitations of each culture system

b)Discuss the cellular competence in *in vitro* morphogenesis. Write in detail the different pathways of *In vitro* morphogenesis?

OR

b)With suitable examples explain different applications of zygotic embryo cultures.

ii) a) Explain various methods for isolation of protoplasts.

b)Define somaclonal variation. How do somaclonal variations occur in vitro? Explain.

OR

b) Factors controlling the biomass during the production of 2^0 metabolites

iii) a) Explain different strategies for *in vitro* germplasm conservation.

b) Describe the method, advantages and limitations of microinjection.

OR

b) What are reporter genes? Explain **any one** in detail.

iv) a) Explain the role of Hypersensitive Response (HR) in plant defense.

b) What are QTLs? Explain how Marker Assisted Selection is used in QTL identification.

OR

b) Explain **any one** signal transduction pathway during plant defence against pathogens.

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