

## S.Y.B.Sc. Sem III MICROBIOLOGY I

Date 26 March 2019

QP Code 53715

- Q.1 A. Define the following: (05)**
- Oligonucleotide** – short nucleic acid containing 50 or fewer nucleotides.
  - Jaccard coefficient** – the ratio of characters that are present in both the organisms.
  - Polycistronic** – when mRNA codes for two or more different polypeptides
  - Complex lipids** – fatty acid esters of glycerol containing polar phosphorylated compounds that include lecithin, phosphatidic acids, phosphatidyl serine
  - Simple polysaccharide** – polymers of a single sugar or amino sugar e.g. glycogen, glucan, mannan, chitin
- Q.1 B. State whether the following statements are true or false: (05)**
- Ferric chloride is used for making orcinol reagent. **True**
  - The standard used in anthrone method of estimation is glucose. **True**
  - The number of helical turns in a DNA molecule provides a precise description of supercoiling. **True**
  - Pyrimidines are planar molecules. **True**
  - Outer surface proteins of *Treponema pallidum* can be used for phylogenetic analysis. **False**
- Q.1 C. Give one example for each of the following: (05)**
- Proteins that can be used as standard in biuret method – **BSA, ovalbumin**
  - Processes indicating accumulation of mutations – **aging, carcinogens**
  - Components of chromatin – **DNA, proteins, RNA**
  - Name of genus based on discoverer – **Escherichia, Salmonella, Shigella**
  - Immunological technique for comparison of proteins – **immunodiffusion, ELISA, RIA**
- Q.1 D. Select the most appropriate alternative: (05)**
- Nucleic acid contains around \_\_\_\_\_ (10, 50, 2) % phosphorus.
  - PHB is extracted from cells with alkaline \_\_\_\_\_ (copper sulphate, toluene, hypochlorite).
  - In some viral DNAs the nitrogen bases may be hydroxy-methylated or \_\_\_\_\_ (glycosylated, deaminated, depurinated)
  - F. Meischer isolated a phosphorous containing substance called \_\_\_\_\_ (nucleic acid, nuclein, nucleotide).
  - MLST involves sequencing of \_\_\_\_\_ (random, housekeeping, regulatory) genes.
- Q.2 Answer any two of the following: (20)**
- Discuss the methods for extraction and estimation of RNA from microbial cells. Norris & Ribbons (309, 310, 317), Jayaraman (115)

- ii. Explain about the proteins necessary for the maintenance of condensed chromosome structure.  
Lehninger, Nelson & Cox (943, 944)
- iii. How would you study the GC content of an organism? How does it help in classification?  
Prescott 7/e (473)

**Q.3 A. Answer any three of the following: (18)**

- i. Write a note on Dumas method of Nitrogen estimation from biological sources.  
N&R (220-224), Jayaraman (103, 104), Clarke (228-236)
- ii. Justify – a notable improvement was made by Fiske and Subbarow in phosphorus estimation method.  
N&R (224-227), Clarke (243-247)
- iii. Describe the method for estimation of amino acid content of casein hydrolysate.  
N&R (253-255), Jayaraman (64, 65)
- iv. Discuss any two methods used for estimation of total carbohydrate content of microbial cells.  
N&R (265-272), Jayaraman (53, 54)
- v. How would you quantify the reducing sugar content obtained from microbial cell wall using a titrimetric method?  
N&R (265-272), Jayaraman (53, 54)
- vi. Compare and contrast the different methods used for estimation of proteins.  
N&R (244-249), Jayaraman (78, 79)

**Q.3 B. Name the following: (any two) (02)**

- i. Components of Tashiro's indicator – **methyl red, methylene blue**
- ii. Product of DPA reaction – **beta hydroxyl levulinoldehyde**
- iii. Polar solvents used for extraction of lipids – **ethanol, methanol**
- iv. Cell membrane lipids of Gram-negative bacteria – **phosphatidyl choline, phosphatidic acid, phosphatidyl inositol**

**Q.4 A. Answer any three of the following: (18)**

- i. Diagrammatically explain the hairpin and cruciform forms of DNA.  
LNC (285, 286)
- ii. Schematically explain the reversible denaturation and renaturation of DNA.  
LNC (291, 292)
- iii. Compare and contrast A, B and Z forms of DNA.  
LNC (284-285)
- iv. Write a short note on the non-enzymatic transformations in nucleotides and nucleic acids.  
LNC (293-295)

- v. Justify the statement – “Nucleosomes are the fundamental organisational units of chromatins”.  
LNC (940-942)
- vi. Write a short note on other functions of nucleotides.  
LNC (300-302)

**Q.4 B. Do as directed: (any two)**

**(02)**

- i. State the significance of centromere.  
functions during cell division as an attachment point for proteins linking chromosome to the mitotic spindle. The attachment is essential for the equal and orderly distribution of chromosome sets to daughter cells.
- ii. Give one function of non-histone proteins.  
maintain chromosome structure, regulate expression of genes.
- iii. Explain the term topology.  
the study of the properties of an object that do not change under conditions of continuous deformations due to thermal motion or interaction with proteins or other molecules.
- iv. Give the function of t –RNA.  
Is an adapter molecule that translates the information in mRNA into a specific sequence of amino acids.

**Q.5 A. Answer any three of the following:**

**(18)**

- i. Discuss the Cavalier-Smith system of classification.  
Prescott 7/e (491-493)
- ii. Discuss the techniques used in genomic fingerprinting.  
Prescott 8/e (453)
- iii. What is a dendogram. How would you construct it?  
Prescott 7/e (479, 480)
- iv. Nucleic acid sequencing can be done to classify microorganisms. Justify.  
Prescott 7/e (485, 486)
- v. Give the steps involved in constructing a phylogenetic tree.  
Brock 12/e (456-458)
- vi. Write a short note on Bergey's Manual.  
Prescott 7/e (493-496)

**Q.5 B. Do as directed: (any two)**

**(02)**

- i. What is the difference between rooted and unrooted tree?  
Rooted trees have a single ancestor while unrooted trees do not.
- ii. Name the method used for DNA sequencing.  
Sanger's method

- iii. Give contribution of Carl Woese.  
Used 16S rRNA to study evolutionary relationship of organisms.
- iv. Which proteins are preferred for amino acid sequencing?  
Electron transport proteins, heat shock proteins. Histones, transcription and translation factors

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