

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

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QP Code 53714

Q.I A. Define the following: (05)

- i. **Dehydrating agents** – polar solvents used for extraction of lipids, wherein they rupture the lipid protein linkages present in the cell organelle
- ii. **Polynucleotide** – long nucleic acid chain containing more than 50 nucleotides
- iii. **Hypochromic effect** – interactions between stacked bases in nucleic acids when two complementary nucleic acid strands are paired leads to decrease in the absorption of UV light
- iv. **Complex polysaccharides** – polymers containing several different sugars, amino sugars, uronic acids, etc examples of these are the capsular polysaccharides and lipopolysaccharides of bacteria
- v. **T_m** – the temperature at which double stranded DNA gets converted into single stranded form

Q.1 B. State whether the following statements are true or false: (05)

- i. Furfural derivatives are formed on reaction of acids with sugars. **True**
- ii. Lipid content of Mycobacterial cell wall is very high. **True**
- iii. DNA molecules are the largest macromolecules in a cell. **True**
- iv. t-RNAs are adapter molecules. **True**
- v. Buoyant density of DNA increases with increase in GC content. **True**

Q.I C. Give one example for each of the following: (05)

- i. PHB producing organism – - ***Bacillus megaterium, Azotobacter chroococcum, Pseudomonas spp***
- ii. Regulatory nucleotides – **cAMP, cGMP, ppGpp**
- iii. Classes of histones – **H1, H2A, H2B, H3, H4**
- iv. Sugars that can be used as standard in orcinol estimation – **ribose, xylose**
- v. Ecological characteristics studied for taxonomy – **life cycle pattern, symbiotic relationship, disease caused, habitat preference**

Q.I D. Select the most appropriate alternative: (05)

- i. Ninhydrin reagent contains _____ (phosphate, **acetate**, barbiturate) buffer.
- ii. _____ (potassium acid phthalate, potassium tartrate, **sodium acetate**) is used for titration in Kjeldahl method.
- iii. Strand separation of DNA is a requirement for replication and _____ (**transcription**, translation, excision).
- iv. Deamination of cytosine results in the formation of _____ (adenine, guanine, **uracil**).

- v. Bergey's Manual of _____ (**Determinative**, Systematic, Taxonomic) Bacteriology was first published in 1923.

Q.2. Answer any two of the following: (20)

- i. Discuss the methods for extraction and estimation of DNA from biological sources.
Norris & Ribbons (309, 310, 316)
- ii. Diagrammatically explain the changes in the chromosome structure during eukaryotic cell cycle.
Lehninger Nelson & Cox (938, 939)
- iii. Describe the different approaches for phylogenetic analysis.
Prescott 7/e (485, 486), Brock 12/e (389, 390)

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

- i. Discuss the various modifications of Kjeldahl method.
N&R (220-224), Jayaraman (103, 104), Clarke (228-236)
- ii. Discuss the methods used for estimation of elemental carbon.
N&R (216, 217), Jayaraman (75-78), Clarke (228-236)
- iii. Briefly describe the direct Biuret method used for estimation of proteins.
N&R (244-249), Jayaraman (78,79)
- iv. Write a note on total carbohydrate estimation by Phenol –Sulphuric acid method.
N&R (265-272), Jayaraman (53, 54)
- v. Compare and contrast between Fehling's and anthrone method.
N&R (265-272), Jayaraman (53, 54)
- vi. Justify Ninhydrin reagent can be used to estimate tryptophan from a sample.
N&R (253-255), Jayaraman (64, 65)

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

- i. Reagent used for colorimetric estimation of RNA – **orcinol**
- ii. Stain used for staining of lipid granules – **Sudan black B**
- iii. Colour stabilizer in DNSA reagent – **Na-K-tartrate (Rochelle salt)**
- iv. Macromolecular components present in cell membrane – **phospholipids, glycolipids, oligosaccharides, integral proteins**

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

- i. Schematically explain the nucleotide sequence of a Penta deoxyribonucleotide.
LNC (277, 278)
- ii. Diagrammatically explain palindromes and mirror repeats.
LNC (285)
- iii. Write a short note on ribonucleic acids.
LNC (288, 289)
- iv. Discuss the properties of nucleotide bases.

LNC (278, 279)

- v. Justify the statement – “SMC proteins are necessary for the maintenance of condensed chromosome structures”.

LNC (943)

- vi. Write a short note on DNA supercoiling.

LNC (930-932)

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

(02)

- i. State the functions of regulatory sequences.
provide signals that may indicate the beginning or end of genes, influence the transcription of genes, function as initiation points for replication and recombination.
- ii. What alters the topological properties of DNA.
breaking and re-joining of the backbone of one or both DNA strands.
- iii. Explain the term – annealing.
the unwound segments of the two strands of DNA spontaneously rewind when the temp or pH is returned to the range in which most organisms live is called annealing
- iv. Give the role of nucleotides in cellular metabolism.
energy currency in metabolic transactions, essential chemical links in response of cells to hormones and metabolic intermediates

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

(18)

- i. Write a short note on nucleic acid hybridization.
Prescott 7/e (483, 484)
- ii. Describe the different methods of comparing proteins for classification.
Prescott 7/e (487, 488)
- iii. Discuss the thermal denaturation method.
Prescott 7/e (483)
- iv. Give the importance of microbial taxonomy.
Prescott 7/e (478)
- v. Discuss ribotyping and rep-PCR.
Brock 12/e (387-389), Prescott 7/e (487)
- vi. What kind of characteristics are studied in phenotypic analysis?
Prescott 7/e (482)

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

(02)

- i. What are conserved indels?
Inserts or deletions of specific lengths and sequences at fixed positions, which may be found exclusively among all members of one or more phyla.
- ii. Define prokaryotic species

A collection of strains that share many stable properties and differ significantly from other groups of strains.

iii. Name any gene other than 16S rRNA used for phylogenetic analysis.

rec A, gyr B

iv. Name the two phyla of archaea.

Crenarchaeota, *Euryarchaeota*
