

**M.Sc. BOTANY**  
**Second Semester**  
**MOLECULAR CELL BIOLOGY**  
**(MSB – 201)**

**Duration: 3Hrs.**

**Full Marks: 70**

Part-A (Objective) =20

Part-B (Descriptive) =50

**(PART-B: Descriptive)**

**Duration: 2 hrs. 40 mins.**

**Marks: 50**

**Answer any four from Question no. 2 to 9**  
**Question no. 1 is compulsory.**

1. Differentiate light microscopes from electron microscopes. Describe in detail principle and working of phase contrast microscopy with schematic diagram. (5+5=10)
2. Give a comparative account of A, B and Z forms of DNA. (10)
3. Explain the Hardy-Weinberg equilibrium of population genetics with special emphasis on the factors responsible for equilibrium. (6+4=10)
4. What is molecular evolution? Describe different tools in molecular phylogeny. (2+8=10)
5. What is polytene chromosome? Explain the structure and function of centromere and telomere. (3+7=10)
6. Write different mechanisms involve in repairing of damaged DNA in E. coli. (10)
7. What is the basic difference between transcription and translation? How do the nucleotides of mRNA chains encode information for the formation of amino acid sequences of a protein? (4+6=10)
8. What is one gene one enzyme hypothesis? Justify the hypothesis with 'in-born error of metabolism'. Explain the metabolic pathway of phenylketonuria. (2+3+5=10)
9. Differentiate the prokaryotic and eukaryotic genome organization. (5+5=10)

**M.Sc. BOTANY**  
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**Duration: 20 minutes**

**Marks – 20**

**(PART A - Objective Type)**

**I. Choose the correct answer:**

**1×20=20**

- i) Scanning electron microscopy (SEM) is best used to study:  
a. small internal cell structures    b. surface morphology  
c. all of the above    d. none the above
- ii) Monochromatic (one color) light is sometimes used to increase the resolution of light microscopes. Light of which color below would give you the best resolution?  
a. Red    b. Orange    c. Green    d. Blue
- iii) Phase Contrast microscopy:  
a. Continuously changes the phase of the incident light from the condenser to improve contrast in the specimen.  
b. Uses circular filters in the condenser and objective to give contrast to parts of the cell with different refractive indices.  
c. Uses special lenses to distinguish between solid and liquid phases of the cell.  
d. Uses special lenses to change the color of light passing through them.
- iv) Which of the following statements about Transmission Electron Microscopy is not true?  
a. The specimen must be stained with osmium or other heavy metal.  
b. The specimens are placed in a high vacuum for viewing.  
c. The specimens must be sliced very thin, 20-100 nm in thickness.  
d. The beam is focused by electromagnetic lenses.
- v) I am a protein packaging and shipping machine! Who am I?  
a. vacuole    b. ribosome  
c. endoplasmic reticulum    d. golgi apparatus
- vi) Microfilaments are composed mainly of a protein called:  
a. actin    b. tubulin    c. myosin    d. chitin
- vii) Plant cell wall mainly composed of :  
a. cellulose    b. starch    c. protein    d. lipid
- viii) Smooth endoplasmic reticulum is the site of:  
a. Protein synthesis    b. Carbohydrate synthesis  
c. Amino acid synthesis    d. Lipid synthesis
- ix) Assembly of two subunits 40 S and 60 S of the eukaryotic ribosome is:  
a. 100 S unit    b. 80 S unit  
c. 70 S unit    d. 90 S unit
- x) Among the following which is characteristic feature of Meiosis I?  
a. Separation of chromatids    b. Separation of homologous chromosomes  
c. Doubling of DNA content    d. Movement of chromosome towards poles
- xi) Which of the following is the transposable genetic element in maize?  
a. IS element    b. AC and DS factors  
c. Retrotransposones    d. T<sub>n</sub> family
- xii) Alkaptonuria occurs due to the deficiency of:  
a. Phenylalanine Hydroxylase    b. Homogentisic acid oxidase  
c. Cystathion synthetase    d. Galactose I Phosphate uridyl transferase
- xiii) The evolution of species is based upon sum total of adaptive changes preserved by:  
a. Natural selection    b. Isolation  
c. Speciation    d. Human conservation
- xiv) Lamarck theory of organic evolution is usually known as:  
a. Natural selection    b. Inheritance of acquired characters  
c. Descent with change    d. Continuity of fermplasm
- xv) Continuity of Germplasm theory was given by:  
a. De Vries    b. Darwin  
c. Weismann    d. Lamarck
- xvi) Which of the following is not a necessary component of translation?  
a. Anticodon    b. mRNA  
c. Ligase    d. Amino acid
- xvii) The lac operon contains the z, y and a structural genes:  
a. encoding p-galactosidase, galactose permeases and thio-galactosidase transacetylase respectively.  
b. encoding p-galactosidase and galactose permeases.  
c. encoding P-galactosidase only.  
d. None of the above.
- xviii) The direction of amino acid transfer to the growing polypeptide chain is:  
a. from the A (aminoacyl tRNA site) site to the P (peptidyl tRNA site) site on the ribosome.  
b. from the P site to the A site on the ribosome.  
c. from the A site to the E (exit tRNA site) site on the ribosome.  
d. from the P site to the E site on the ribosome.
- xix) The anticodon of tRNA:  
a. binds to rRNA    b. binds to an amino acid  
c. binds to the Shine Dalgarno sequence    d. binds to an mRNA codon

- xx) C-value is the measurement of:
- amount of genomic DNA in haploid set of chromosome.
  - amount of genomic DNA in diploid set of chromosome.
  - amount of proteins in haploid set of chromosome.
  - amount of mRNA in haploid set of chromosome.

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University of Science and Technology, Meghalaya

Date Stamp: \_\_\_\_\_

SESSION: 2016-17				
COURSE _____ PAPER Code: _____				
NAME OF THE PAPER: _____				
SEMESTER _____				
<p align="center"><b>Instructions to Candidates</b></p> <ol style="list-style-type: none"> <li>This answer booklet has 4 pages. Please check before writing whether it is complete or in good condition.</li> <li>Do not write your name anywhere in the answer booklet.</li> <li>Write legibly on both sides of the paper</li> <li>You may use some space for any rough notes or calculation on the answer booklet if you need. These rough notes, calculations must be scored out before submitting the answer booklet.</li> <li>Do not bring any book or loose paper in the examination hall.</li> <li>Do not tear any page from the answer booklet.</li> <li>Do not write anything on the question paper or blotting paper or any pieces of paper while you are in the examination hall.</li> <li>Any act of indiscipline or misbehavior in the examination hall will result in your expulsion.</li> <li>No examinee is allowed to leave the examination hall until 30 minutes lapse after the commencement of the examination.</li> <li>Additional answer sheet will be supplied after the main answer booklet is completed.</li> </ol>	<b>For Objective Type Questions</b>		Session: 2016-17	
	Page No.	Marks	Course _____	
			Roll No. _____	
			Enrollment No. _____	
			Semester _____	
			Name of the Paper _____	
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	Total		Paper Code _____	
	<b>For Descriptive Type Questions</b>			
Question No.	Marks			
Total				
<b>Grand Total</b>				

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Scrutinizer's Signature

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Examiner's Signature

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Invigilator's Signature