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63/1 (SEM-5) DSE1A/BOTRE5016

2023

BOTANY

Paper : BOTRE5016

(Analytical Techniques in Plant Sciences)

Full Marks : 60

Pass Marks : 24

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct answer : **(any five)** 1×5=5
- (a) Resolving power of a microscope can be defined
- (i) as to see the object very closely through microscope
 - (ii) as to distinguish *two* closely-spaced points through microscope
 - (iii) as to see the object bigger through microscope
 - (iv) as to see the single point very brightly through microscope

Contd.

- (b) Electron microscope was developed by
- (i) Knoll and Ruska
 - (ii) Kary Mullis
 - (iii) Watson and Crick
 - (iv) Carl Zeiss
- (c) Centrifugation works on the principle of
- (i) evaporation
 - (ii) sedimentation
 - (iii) sublimation
 - (iv) infiltration
- (d) Probably first and simplest type of chromatography is
- (i) Thin layer chromatography
 - (ii) Paper chromatography
 - (iii) Column chromatography
 - (iv) Liquid chromatography

- (e) Flow cytometer is not similar with microscope
- (i) as it does not use fluorescent dyes
 - (ii) as it does not measure cell size
 - (iii) as the fluorescence light emitted does not pass through mirror system
 - (iv) as it does not provide a focused image
- (f) Which of the following is not related with electron microscope ?
- (i) Specimen section is coloured with a specific staining solution
 - (ii) Presence of series of lenses in microscope
 - (iii) The resolution of an image depends upon the wavelength of the light used
 - (iv) Sample holder to hold the specimen

(g) Relating to spectrophotometry the visible light range is

(i) 190 nm to 800 nm

(ii) 400 nm to 800 nm

(iii) 190 nm to 400 nm

(iv) 570 nm to 590 nm

(h) Which of the following is true about SEM ?

(i) It does not produce ultrastructural details of a sample

(ii) It does not focused beam of electrons interact with the sample

(iii) It does not form area ranging 1 cm to 5 microns in wide for image

(iv) It does not show best resolution in specimen section of 30 to 60 nm

(i) Which of the following is true about thin layer chromatography ?

(i) Stationary phase is made up of a blotting paper

(ii) Stationary phase is made up of a silica layer

(iii) Stationary phase is within a tube

(iv) A mixture of sample solution is pipetted on the top of the stationary phase

(j) The mean value of the data 20, 10, 17, 40, 18 is

(i) 20

(ii) 21

(iii) 17

(iv) 18

2. Answer the following questions : **(any five)**
2×5=10

(a) Name the *two* types of electron microscope.

(b) Mention the importance of centrifuge in biological science.

(c) Write the full form of PAGE under electrophoresis technique.

(d) What is retention ratio or R_f-factor ?

(e) Write the full form of HPLC under chromatographic technique.

(f) What is arithmetic mean ?

(g) Mention the use of statistic in botanical studies.

3. Write short notes on: (**any five**) $5 \times 5 = 25$

- (a) Light microscopy
- (b) Shadow casting
- (c) Importance of cell fractionation of biological sample
- (d) Working principle of electrophoresis
- (e) Column chromatography
- (f) Thin layer chromatography
- (g) Chi-square test
- (h) Standard deviation
- (i) Autoradiography and its principles . .

4. Answer **any two** of the following questions :
 $10 \times 2 = 20$

- (a) What is fluorochrome? Describe the working principle of a fluorescent microscope with neat sketch.
 $1 + (7 + 2) = 10$
- (b) Write the working principle of scanning electron microscope with neat sketch.
 $7 + 3 = 10$

(c) What is a centrifuge? Write in detail on density gradient centrifugation.

$2 + 8 = 10$

(d) What is UV-visible spectrophotometer? Write in detail on the applications of spectrophotometer.

$2 + 8 = 10$