लक्ष्यं विधमानम्

WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 6th Semester Examination, 2023

BOTACOR13T-BOTANY (CC13)

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

1. Answer ***all*** questions briefly from the following: 1×6 = 6

(a) What do you mean by catabolic pathway? Give an example.
(b) What are uncouplers?
(c) Name the enzymes required for catabolism of sucrose and starch.
(d) What is glucogenic amino acid?
(e) What is quantum yield?
(f) Why ATP is called energy currency?

2. Answer any ***eight*** questions from the following: 3×8 = 24

(a) Indicate the reactions where C4 and C7 sugars are involved in the oxidative pentose phosphate and reductive pentose phosphate pathways.
(b) Write a note on the anaplerotic reactions in relation to TCA cycle.
(c) Write briefly on the calcium calmodulin concept as second messenger.
(d) Schematically show the biochemical reactions of β oxidation of fatty acids.
(e) Give the biochemical reaction and the enzymes involved in the conversion of Pyruvic acid to Acetyl CoA. $1\frac{1}{2}+1\frac{1}{2}$
(f) State the significance of cyanide resistant respiration.
(g) Discuss the role of GS and GOGAT in ammonium assimilation.
(h) Differentiate between absorption spectrum and action spectrum.
(i) Write a note on Blackman law of limiting factors.
(j) Differentiate between pigment system-I and pigment system-II.
(k) Write a note on oxygen evolving complex.
(l) Briefly explain the carbon concentrating mechanisms in plant.

3. Answer any ***two*** questions from the following: 5×2 = 10

(a) Write a note on G-protein induced mechanism of signal transduction.
(b) Comment on the different types of phosphorylation in plant metabolism. Draw the structure of ATP synthase. 3+2
(c) With proper illustration discuss the binding change mechanism of ATP synthesis. 2+3
(d) Give the schematic representation of crassulacean acid metabolism and dark CO_2 fixation.

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লক্ষ্যং বিদ্যমানম্

WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 6th Semester Examination, 2023

BOTADSE04T-BOTANY (DSE3/4)

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks. Candidates should answer in their own words and adhere to the word limit as practicable.

প্রান্তিক সীমার মধ্যস্থ সংখ্যাটি পূর্ণ মান নির্দেশ করে। পরীক্ষার্থীরা নিজের ভাষায় যথা সম্ভব শব্দসীমার মধ্যে উত্তর করিবে।

1. Answer the following questions: 1×16 = 16
নিম্নলিখিত প্রশ্নগুলির উত্তর দাওঃ

(a) Write the full form of FACS.
FACS-এর পুরো নাম লেখো।

(b) What is the magnification of a microscope?
একটি অণুবীক্ষণ যন্ত্রের বিবর্ধন কি ?

(c) Write the function of marker enzyme.
মার্কার এনজাইম-এর কাজ লেখো।

(d) Write the definition of Centrifugation.
সেন্ট্রিফিউগেশন-এর সংজ্ঞা লেখো।

(e) What do you mean by differential centrifugation?
ডিফারেনসিয়াল সেন্ট্রিফিউগেশন বলতে কি বোঝ ?

(f) Define autoradiography.
অটোরেডিওগ্রাফির সংজ্ঞা দাও।

(g) Write an use of radioisotope in biological research.
জৈব গবেষণায় রেডিওআইসোটোপের একটি ব্যবহার লেখো।

(h) Write the difference between colorimeter and spectrophotometer.
কলোরিমিটার এবং স্পেক্ট্রোফোটোমিটারের পার্থক্য নিরূপণ করো।

(i) What do you mean by absorbance of light wave in spectrophotometer?
স্পেক্ট্রোফোটোমিটারের আলোক তরঙ্গ শোষণ বলতে কি বোঝো ?

(j) What do you mean by R_f?
R_f বলতে কি বোঝো ?

(k) What do you understand by mobile and stationary phases of chromatography?
ক্রোমাটোগ্রাফিতে মোবাইল ও স্টেশনারি ফেজ বলতে কি বোঝো ?

(l) What is native PAGE?
নেটিভ PAGE বলতে কি বোঝো ?

(m) What is the role of β-mercaptoethanol?
β-mercaptoethanol-এর কাজ কি ?

(n) What do you mean by standard error?
প্রমাণ ত্রুটি বলতে কি বোঝো ?

(o) What is central tendency?
কেন্দ্রীয় প্রবণতা কি ?

(p) What is the full form of HPLC?
HPLC-এর পুরো নাম কি ?

2. Answer any ***eight*** questions from the following: 3×8 = 24
নিম্নলিখিত যে-কোনো ***আটটি*** প্রশ্নের উত্তর দাওঃ

(a) Write the difference between TEM and SEM.
TEM এবং SEM-এর পার্থক্য লেখো।

(b) Write the working principle of fluorescence microscopy.
ফ্লুরেসেন্স মাইক্রোস্কোপির কার্যনীতি বর্ণনা করো।

(c) Distinguish between differential and density gradient centrifugation.
ডিফারেন্সীয়াল ও ঘনত্ব গ্রেডিয়েন্ট সেন্ট্রিফিউগেশনের মধ্যে পার্থক্য লেখো।

(d) Write a note on ultracentrifugation.
আল্ট্রাসেন্ট্রিফিউগেশনের উপর একটি টীকা লেখো।

(e) Write the principle of spectrophotometry.
স্পেক্ট্রোফোটোমেট্রির কার্যনীতি লেখো।

(f) Write important uses of spectrophotometry in biological science.
জৈব গবেষণায় স্পেক্ট্রোফোটোমেট্রির গুরুত্বপূর্ণ ব্যবহারগুলি লেখো।

(g) Briefly describe the process of ion exchange chromatography.
আয়ন এক্সচেঞ্জ ক্রোমাটোগ্রাফি পদ্ধতিটি সংক্ষেপে বর্ণনা করো।

(h) Write a short note on SDS-PAGE.
SDS-PAGE সম্পর্কে টীকা লেখো।

(i) Mention the procedure of autoradiography.
অটোরেডিওগ্রাফির পদ্ধতিটি সংক্ষেপে লেখো।

(j) Write the working principle of X-ray crystallography.
এক্স-রে ক্রিস্টালোগ্রাফির কার্যনীতি বর্ণনা করো।

(k) Write the difference between mean, median and mode.
মিন, মিডিয়ান এবং মোডের মধ্যে পার্থক্য নিরূপণ করো।

(l) Write down the steps of goodness of fit.
গুডনেস অফ ফিটের পর্যায়গুলি (ধাপ) লেখো।

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सत्यं विजयमानम्

WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 6th Semester Examination, 2023

BOTADSE06T-BOTANY (DSE3/4)

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

1. Answer the following questions briefly: 1×16 =16

(a) State the different types of data collection procedure.

(b) The mean of 6 observations is 17.5. If five of them are 14, 9, 23, 25 and 10, find the sixth observation.

(c) Give the formula for χ^2 statistic.

(d) State the merits of mode.

(e) Write down the two properties of line of regression.

(f) Explain graphically the line of best fit.

(g) Find the coefficient of correlation between X and Y, when $\text{cov}(X, Y) = 2.75$, $\text{var}(X) = 6.25$ and $\text{var}(Y) = 20.25$.

(h) Find the mean of the positive factors of 24.

(i) The mean of 10 (ten) numbers is 55. If one number is included, then mean becomes 60. Find the included number.

(j) If m is the mid point and l is the upper limit of a class in a continuous frequency distribution, then what is the lower limit of the class?

(k) If the mean of the five observations, $m+1$, $m+3$, $m+5$, $2m+2$, $3m+3$ is 14, find the mean of the first three observations.

(l) Calculate the range and coefficient of range of the following data:

60, 70, 80, 100, 120, 140, 160, 170, 180, 200

(m) Write the formula of calculations of correlation of coefficient when p and q are the two variables.

(n) Mention different measures of testing of hypothesis.

(o) What is contingency table?

(p) If the median of 5 items is 3 and the median of another 5 items is 7, can you find the median of all the 10 items taken together?

2. Answer any ***eight*** questions from the following: 3×8 = 24

(a) Find the values of f_1 and f_2 from the following distribution, given the median is 28, and the total number of observations is 50.

A	0-10	10-20	20-30	30-40	40-50
B	5	f_1	15	f_2	6

(b) Calculate the mean, standard deviation and standard error of the height of the plants as given below (measured in cm)

139, 122, 120, 122, 126, 129, 134, 131, 132, 139

(c) The sum and the sum of squares corresponding to length X in cm and weight Y in g of 50 plants are given below:

$$\Sigma X = 212,\ \Sigma X^2 = 902.8,\ \Sigma Y = 261,\ \Sigma Y^2 = 1457.6$$

Which is more varying, the length or weight?

(d) If for a distribution $\sum(X-5)=3$, $\sum(X-5)^2=43$ and the total number of items is 18, find the standard deviation.

(e) Critically compare between correlation and regression.

(f) What do you mean by standard deviation? Mention the merits and demerits of standard deviation. 1+2

(g) There are 9 boys and 9 girls in a class. Their heights are given below: 3

Boys	170	175	165	162	168	170	172	163	162
Girls	152	165	155	161	168	160	155	154	152

Calculate the variance of height separately for the boys and girls.

(h) Find the line of best fit to the following data using:

X	1	3	4	6	8	9	11	14
Y	1	2	4	4	5	7	8	9

(i) Show that if five students get respectively 1, 2, 3, 4, 5 marks (x) out of 10 in subject A and 3, 3, 5, 7, 6 marks (y) out of 10 in subject B, the regression equation of y on x can be written as $y = 1.8 + x$.

(j) Define quartile deviation. Find out the interquartile range and quartile deviation from the following: 1+2

No. of Students	28	40	52	100	80	48	32	20	07
Height (cm)	150	152	154	156	158	160	162	164	166

(k) Four of the self-fertilized F_1 plants that Mendel observed for segregating of yellow and green seeds colour showed the following results among their seeds.

Plants	1	2	3	4
Yellow seeds	25	32	14	70
Green seeds	11	7	5	27

Test the homogeneity of the four plants for the 3:1 ratio and calculate the Chi-square value.

(l) An IQ Test was administered to 5 (five) persons before and after they are trained. The results are given below:

Candidates	I	II	III	IV	V
IQ before training	110	120	123	132	125
IQ after training	120	118	125	136	121

Test whether there is any change in IQ after training programme [$t_{0.05} = 2.306$ for df 8].

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सत्यं विक्षमानम्

WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 6th Semester Examination, 2023

BOTACOR14T-BOTANY (CC14)

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

1. Answer the following questions in brief: 1×6 = 6

(a) What is totipotency?

(b) Which chemical enhances vir gene expression?

(c) Which enzymes are known as 'molecular scissors'?

(d) Name the pair of hormones required for a callus to differentiate.

(e) What is the role of osmoticum during isolation of protoplast?

(f) What do you mean by vector less gene transfer?

2. Answer any ***eight*** questions from the following: 3×8 = 24

(a) Briefly discuss the functional role of different types of plant growth regulators used in tissue culture.

(b) What is somatic hybrid? Briefly discuss the role of somatic hybrid in plant tissue culture. 1+2

(c) Differentiate between blunt end cuts and staggered end cuts by restriction endonuclease with examples.

(d) How cloning vectors differ from expression vectors? Give one example of each.

(e) Write a brief note on pBR322 vector.

(f) Give a brief account of the commonly used physical gene delivery methods in plants.

(g) What is the colony hybridization method of screening in recombinant DNA technology?

(h) Briefly describe the protocol of construction of c-DNA libraries.

(i) Mention the importance of marker gene in plant transformation technique. What do you mean by 'reporter gene'? 2+1

(j) What is haploid culture? Write the uses of haploid culture. 1+2

(k) Describe the role of transgenics in bioremediation.

(l) Write short note on genetically engineered pharmaceutical products.

3. Answer any *two* from the following: $5\times2 = 10$

(a) Briefly describe the different stages of micropropagation. State the limitations of micropropagation technique. 4+1

(b) Enlist the advantages and disadvantages of genetically modified crops.

(c) What is transgenic plant? Describe the process of development of Bt cotton. 1+4

(d) Differentiate between: $2\frac{1}{2}+2\frac{1}{2}$

(i) Somatic and zygotic embryogenesis

(ii) YAC and BAC vector.

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सत्यं विश्वमानम्

WEST BENGAL STATE UNIVERSITY

B.Sc. Programme 6th Semester Examination, 2023

BOTGDSE04T-BOTANY (DSE2)

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks. Candidates should answer in their own words and adhere to the word limit as practicable.

প্রান্তিক সীমার মধ্যস্থ সংখ্যাটি পূর্ণ মান নির্দেশ করে। পরীক্ষার্থীরা নিজের ভাষায় যথা সম্ভব শব্দসীমার মধ্যে উত্তর করিবে।

1. Answer the following questions: 1×16 = 16
নিম্নলিখিত প্রশ্নগুলির উত্তর দাওঃ

(a) What do you mean by confocal microscope?
কনফোকাল মাইক্রোস্কোপ বলতে কী বোঝো ?

(b) Write the working principle of electron microscope.
ইলেকট্রন মাইক্রোস্কোপের কার্যনীতি লেখো।

(c) Write a short note on chromosome banding.
ক্রোমোজোম ব্যান্ডিং সম্পর্কে সংক্ষিপ্ত টীকা লেখো।

(d) Distinguish between differential and density gradient centrifugation.
ডিফারেনশিয়াল ও ঘনত্ব গ্রেডিয়েন্ট সেন্ট্রিফিউগেশন-এর মধ্যে পার্থক্য লেখো।

(e) What is the purpose of cell fractionation?
সেল ফ্র্যাকশনেশনের উদ্দেশ্য কি ?

(f) Define autoradiography.
অটোরেডিওগ্রাফির সংজ্ঞা লেখো।

(g) Write a use of radioisotope in biological science.
জীববিজ্ঞানে রেডিও-আইসোটোপের একটি ব্যবহার লেখো।

(h) Differentiate between colorimeter and spectrophotometer.
কলোরিমিটার ও স্পেক্ট্রোফোটোমিটারের পার্থক্য লেখো।

(i) Write the difference between absorbance and transmission of light in spectrophotometer.
স্পেক্ট্রোফোটোমিটারে আলোকের শোষণ ও ট্রান্সমিশনের পার্থক্য লেখো।

(j) What do you mean by R_f?
R_f বলতে কি বোঝো ?

(k) Name one buffer that is used in PAGE.
PAGE-এ ব্যবহৃত একটি বাফারের নাম লেখো।

(l) What is Native PAGE?
নেটিভ PAGE কি ?

(m) What is the role of SDS in SDS-PAGE?
SDS-PAGE এ SDS-এর কাজ কি ?

(n) What is the full form of HPLC?
HPLC-এর পুরো নাম কি ?

(o) What is standard deviation?
আদর্শ বিচ্যুতি কি ?

(p) Define chi-square test.
Chi-square test কি ?

2. Answer any ***eight*** questions from the following: 3×8 = 24
নিম্নলিখিত যে-কোনো *আটটি* প্রশ্নের উত্তর দাওঃ

(a) Differentiate between TEM and SEM.
TEM ও SEM-এর পার্থক্য লেখো।

(b) Give the differences between molecular sieve chromatography (Gel filtration) and ion exchange chromatography.
জেল ফিল্ট্রেশন ও আয়ন এক্সচেঞ্জ ক্রোমাটোগ্রাফির পার্থক্য লেখো।

(c) Write the working principles of fluorescence microscopy.
ফ্লুরেসেন্স মাইক্রোস্কোপির কার্যনীতি লেখো।

(d) Write the applications of electron microscope in biological science.
জীববিজ্ঞানে ইলেকট্রন মাইক্রোস্কোপের ব্যবহার লেখো।

(e) Enumerate the working principle of UV-Vis spectrophotometer.
UV-Vis স্পেকট্রোফোটোমিটারের কার্যনীতি লেখো।

(f) Write about the Beer's-Lambart's Law.
Beer's-Lambart's Law সম্পর্কে লেখো।

(g) Write a short note on PAGE.
PAGE সম্পর্কে সংক্ষিপ্ত টীকা লেখো।

(h) Mention the steps of Agarose Gel electrophoresis.
এ্যাগারোজ জেল ইলেকট্রোফোরেসিসের পর্যায় উল্লেখ করো।

(i) State the procedure of autoradiography.
অটোরেডিওগ্রাফির পদ্ধতি লেখো।

(j) Why the isotopes emitting β-radiation used in biological research?
β-রশ্মি নির্গমনকারী আইসোটোপ জীববিজ্ঞান গবেষণায় কেন ব্যবহার করা হয় ?

(k) Write down the steps of goodness of fit.
গুডনেস অফ ফিটের পর্যায়গুলি লেখো।

(l) Find the mode of following data:
নিম্নলিখিত সংখ্যাগুলির মোড নির্ণয় করোঃ

(11, 16, 14, 18, 16, 12, 16, 13, 18)

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सत्यं विजयानम्

WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 6th Semester Examination, 2023

CEMACOR13T-CHEMISTRY (CC13)

INORGANIC CHEMISTRY-V

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

Answer any *three* questions taking *one* from each unit

Unit-I

1. (a) What are trace elements in biological systems? Why are they so called? Give names of two essential ultra trace elements. 1+1+1

   (b) Between Hb-O_2 and Hb which one is paramagnetic? "Both O_2 and CO are neutral molecule but CO can destroy the normal activity of Hb" — Comment on it. 2+2

   (c) Define facilitated diffusion in the context of ion transport across biological membrane. Why is the sodium-potassium exchange process described as sodium-potassium pump? 2+2

   (d) Give active site structure of Cytochrome C. 2

   (e) What are the harmful effects of arsenic in human body? Mention the method of removal by Chelation therapy. 3

2. (a) Describe the structure and electron-transport process of 4Fe-4S ferredoxin. 3

   (b) Give the structural features and functions of "blue blood". 2+2

   (c) Mention the toxic effect of lead. How Pb toxicity is removed from body? 3

   (d) Why nature chooses Zn as hydrolytic enzymes but Fe and Cu as e-transfer enzyme in biological system? 3

   (e) What is Wilson's disease? How it can be treated with the help of Chelation therapy? 3

Unit-II

3. (a) Write a general method for the preparation of $Co_2(CO)_8$. 2

   (b) Complete the following reactions: 4

   $$\text{Ferrocene} + HCHO + (CH_3)_2NH \longrightarrow ? \xrightarrow{MeI} ?$$

   $$\text{Ferrocene} + n\text{-}C_4H_9Li \longrightarrow ? \xrightarrow{N_2O_4} ?$$