

**COOCH BEHAR PANCHANAN BARMA UNIVERSITY**

B.Sc. Honours 3rd Semester Examination, 2020, held in 2021

**BOTANY (PRACTICAL)****PLANT TAXONOMY AND PLANT ANATOMY****GE-3**

Time Allotted: 1 Hour

Full Marks: 15

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.***Answer any one of the following**

15×1 = 15

1. Draw and describe the vegetative and floral characters of any one member from each of the families. Solanaceae and Lamiaceae (Morphology and anatomy of flower, Section of ovary, floral diagram, floral formula and systematic position according to Bentham and Hooker's system of classification).  $7\frac{1}{2} + 7\frac{1}{2} = 15$
2. Draw and describe the anatomical features of *Helianthus* stem and root (Primary and Secondary growth).  $7\frac{1}{2} + 7\frac{1}{2} = 15$

—x—

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**BOTANY****PLANT TAXONOMY AND PLANT ANATOMY****GE-3**

Time Allotted: 2 Hours

Full Marks: 25

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25×1 = 25

1. Discuss the outline Classification System of Angiosperms by J. Bentham and J. D. Hooker. Discuss its merits and demerits. Discuss the author citations with suitable example. 10+5+10
2. Discuss with suitable diagram. Secondary growth in dicot stem and root. Classify and describe different types of meristematic and permanent tissue. 7+7+11

—x—



## COOCH BEHAR PANCHANAN BARMA UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2020, held in 2021

### CHEMISTRY (PRACTICAL)

#### SOLUTIONS, PHASE EQUILIBRIUM, CONDUCTANCE, ELECTROCHEMISTRY AND FUNCTIONAL GROUP ORGANIC CHEMISTRY

#### GE-3

Time Allotted: 1 Hour

Full Marks: 15

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#### GROUP-A

##### Physical Practical

##### Experiment No. 1

Measurement of equivalent conductance ( $\lambda_{eq}$ ) of any 1:1 electrolyte solution in water

- Definition and unit of equivalent conductance: 3
- Equation for calculating equivalent conductance: 3  
(Significance of the terms involved)
- Effect of dilution on equivalent conductance 1  $\frac{1}{2}$

#### GROUP-B

##### Organic Practical

1. Write down the systematic qualitative analysis for the detection of functional group / group(s) present in **any one** of the following organic sample under the given points:

List of Organic Samples

- (i) Salicylic acid      (ii) *p*-Nitro aniline      (iii) *o*-Amino phenol  
(iv) Resorcinol      (v) Glucose

- (a) Physical characteristics of the given sample: Colour and state  $\frac{1}{2} + \frac{1}{2} = 1$
- (b) Test and observation of the Functional group / group(s) present in your selected organic compound:  $6 \frac{1}{2}$

—x—



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B.Sc. Honours 3rd Semester Examination, 2020, held in 2021

### CHEMISTRY

#### GE-3

Time Allotted: 2 Hours

Full Marks: 25

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All symbols are of usual significance.*

**Answer any one question from the following**

25×1 = 25

নিম্নলিখিত যে-কোনো একটি প্রশ্নের উত্তর দাও

1. (a) Write down Gibbs phase rule and explain the terms involved. 3  
গিবসের দশা সূত্রটি লেখ এবং বিভিন্ন পদগুলির ব্যাখ্যা দাও।
- (b) Compare the basicity between aliphatic ammine and aromatic ammine. 3  
অ্যালিফ্যাটিক অ্যামিন এবং অ্যারোমেটিক অ্যামিনের মধ্যে ক্ষারকীয়তার তুলনা কর।
- (c) Differentiate between ideal solution and non-ideal solution. 3  
আদর্শ এবং আদর্শ দ্রবণের মধ্যে পার্থক্য কর।
- (d) Convert the following: 2+2=4  
(i) Glucose  $\rightarrow$  Gluconic acid  
(ii) Fructose  $\rightarrow$  Osazone  
নিম্নলিখিতগুলির রূপান্তর করঃ  
(i) গ্লুকোজ  $\rightarrow$  গ্লুকোনিক অ্যাসিড  
(ii) ফ্রুক্টোজ  $\rightarrow$  ওসাজোন
- (e) The equivalence conductance at infinite dilution for  $\text{CH}_3\text{COONa}$ ,  $\text{HCl}$  and  $\text{NaCl}$  at  $25^\circ\text{C}$  are 78.0, 384.0 and  $109.0 \text{ mho cm}^2 \text{ equiv}^{-1}$  respectively. Calculate the equivalence conductance at infinite dilution ( $\Lambda^\infty$ ) for  $\text{CH}_3\text{COOH}$  at the same temperature. 3  
 $25^\circ\text{C}$  উষ্ণতায়  $\text{CH}_3\text{COONa}$ ,  $\text{HCl}$  এবং  $\text{NaCl}$  এর অসীম লঘুতায় তুলাংক পরিবাহিতা যথাক্রমে 78.0, 384.0 এবং  $109.0 \text{ mho cm}^2 \text{ equiv}^{-1}$  হলে ঐ উষ্ণতায় অসীম লঘুতায়  $\text{CH}_3\text{COOH}$ -এর তুলাংক পরিবাহিতা ( $\Lambda^\infty$ ) নির্ণয় কর।
- (f) Derive Nernst equation for measuring the EMF of a cell. 3  
তড়িৎকোশের EMF নির্ণয় সংক্রান্ত নার্নস্ট সমীকরণটি প্রতিষ্ঠা কর।
- (g) What do you mean by conductometric titration? Draw the conductometric titration curve for the titration of  $\text{HCl}$  and  $\text{NH}_4\text{OH}$ . 1+2 = 3  
পরিবাহিতা টাইট্রেশন বলতে কি বোঝায়?  $\text{HCl}$  এবং  $\text{NH}_4\text{OH}$ -এর প্রশমনের ক্ষেত্রে পরিবাহিতা টাইট্রেশন লেখ অঙ্কন কর।

- (h) What do you mean by solubility product of a sparingly soluble salt? Derive the relationship between solubility and solubility product for  $A_xB_y$  sparingly soluble salt. 1+2 = 3

স্বল্পদ্রব্য লবণের দ্রাব্যতা গুণফল বলতে কি বোঝায়?  $A_xB_y$  স্বল্পদ্রব্য লবণের জন্য দ্রাব্যতা ও দ্রাব্যতা গুণফলের মধ্যে সম্পর্ক নির্ণয় কর।

2. (a) What is phase of a system? Calculate the number of phases, components for the following system. 2+2 = 4



সিস্টেমের দশা কাকে বলে? নিম্নের সিস্টেমের দশা সংখ্যা এবং অবয়ব সংখ্যা নির্ণয় কর।



- (b) Explain the vapour pressure-composition curves for ideal and non-ideal solutions. 4

আদর্শ এবং আদর্শ দ্রবণের ক্ষেত্রে বাষ্পচাপ বনাম সংযুক্তি লেখগুলির ব্যাখ্যা দাও।

- (c) Establish the open chain structure of fructose. 4

ফ্রুক্টোজের মুক্ত শৃঙ্খল গঠন প্রতিষ্ঠা কর।

- (d) Write short notes on (any *two*):  $2 \frac{1}{2} \times 2 = 5$

(i) Mutarotation

(ii) H.V.Z. reaction

(iii) Ionic product of water

সংক্ষিপ্ত টীকা লেখঃ (যে-কোনো দুটি)

(i) মিউটারোটেশন

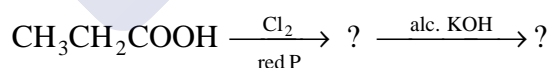
(ii) H.V.Z. বিক্রিয়া

(iii) জলের আয়নীয় গুণফল

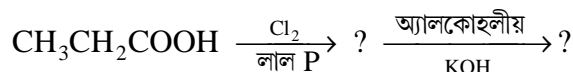
- (e) Explain Reversible and Irreversible cells with examples. 3

পরাবর্ত ও অপরাবর্ত কোশের উদাহরণসহ ব্যাখ্যা দাও।

- (f) Complete the reaction: 2



বিক্রিয়াটি সম্পূর্ণ করঃ



- (g) How would you differentiate  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  amines from the mixture by Hinsberg Method? 3

হিন্‌বার্গ পদ্ধতির দ্বারা কিভাবে  $1^\circ$ ,  $2^\circ$  এবং  $3^\circ$  অ্যামিনগুলির মিশ্রণ থেকে উহাদের সনাক্তকরণ করবে?

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## COOCH BEHAR PANCHANAN BARMA UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2020, held in 2021

### COMPUTER SCIENCE

#### COMPUTER FUNDAMENTALS

#### GE-3

Time Allotted: 2 Hours

Full Marks: 40

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#### Answer any *two* questions from the following

20×2 = 40

1. What is Flowchart? Discuss with example the importance of flowchart in programming. Explain 1's and 2's complement schemes with examples. State and prove De-Morgans theorems. Construct an XOR gate using NANDs. Justify your construction using truth table. 5+5+5+5 = 20
2. Describe a typical Computer System with help of a block diagram and explain the function of each block. Using Karnaugh Maps simplify the following Boolean functions. 10+5+5 = 20  
 $f(A, B, C, D) = \sum(2, 3, 6, 7, 14, 15)$ .  
 How are the fixed and floating-point numbers represented in a computer?
3. Draw the logic circuit of half-adder and explain its operation with help of a truth-table. Prove that a full-adder can also be built by using half-adder. What is memory in computer system? Write down the difference between RAM and ROM. Construct 1:4 Demultiplexer circuit with the help of truth table. (2+3+3) + (2+5)+5 = 20

—x—



## COOCH BEHAR PANCHANAN BARMA UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2020, held in 2021

### MATHEMATICS

#### DIFFERENTIAL CALCULUS

#### GE-3

Time Allotted: 2 Hours

Full Marks: 40

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All symbols are of usual significance.*

**Answer any two questions from the following**

20×2 = 40

নিম্নলিখিত যে-কোনো দুটি প্রশ্নের উত্তর দাও

1. (a) Show that the radius of curvature of the curve  $x^4 + y^4 = 2$  at the point (1, 1) is  $\sqrt{2}/3$ . 7

দেখাও যে  $x^4 + y^4 = 2$  বক্রের (1, 1) বিন্দুতে বক্রতা ব্যাসার্ধ  $\sqrt{2}/3$ .

- (b) Find the asymptotes of the curve given by 7

$$y^3 - x^2y - 2xy^2 + 2x^3 - 7xy + 3y^2 + 2x^2 + 2x + 2y + 1 = 0$$

প্রদত্ত বক্র  $y^3 - x^2y - 2xy^2 + 2x^3 - 7xy + 3y^2 + 2x^2 + 2x + 2y + 1 = 0$  এর অনন্ত স্পর্শকগুলো বের কর।

- (c) State Rolle's theorem. Give geometrical interpretation of Rolle's theorem. 6

Rolle's-এর উপপাদ্যটি বিবৃত কর। Rolle's-এর উপপাদ্যটির জ্যামিতিক তাৎপর্য বিবৃত কর।

2. (a) If  $y = \sin^{-1} x$ , then show that  $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - n^2y_n = 0$ . 7

Hence find  $(y_n)_0$ .

যদি  $y = \sin^{-1} x$  হয় তবে দেখাও যে,  $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - n^2y_n = 0$ .

অতঃপর  $(y_n)_0$  বের কর।

- (b) Examine the differentiability of the function 7

$$f(x) = \begin{cases} x^m \sin \frac{1}{x}, & x \neq 0, \quad m > 0 \\ 0, & x = 0 \end{cases}$$

at a point  $x = 0$ .

$$f(x) = \begin{cases} x^m \sin \frac{1}{x}, & x \neq 0, \quad m > 0 \\ 0 & , \quad x = 0 \end{cases}$$

অপেক্ষকটির  $x = 0$  বিন্দুতে অবকলন যোগ্যতা পরীক্ষা কর।

(c) Evaluate / মান বের করঃ

6

$$\lim_{x \rightarrow 0} \frac{(1+x)^{1/x} - e}{x}$$

3. (a) Suppose  $f(x, y) = xy \frac{x^2 - y^2}{x^2 + y^2}$ ,  $x^2 + y^2 \neq 0$   
 $= 0$ ,  $x^2 + y^2 = 0$

7

verify that  $\frac{\partial^2 f}{\partial x \partial y} \neq \frac{\partial^2 f}{\partial y \partial x}$ .

ধরা যাক  $f(x, y) = xy \frac{x^2 - y^2}{x^2 + y^2}$ ,  $x^2 + y^2 \neq 0$   
 $= 0$ ,  $x^2 + y^2 = 0$

$\frac{\partial^2 f}{\partial x \partial y} \neq \frac{\partial^2 f}{\partial y \partial x}$  যাচাই কর।

(b) Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  be continuous function satisfying

6

$$f(x+y) = f(x) + f(y), \quad \forall x, y \in \mathbb{R}$$

then show that  $f(x) = \lambda x$  for some  $\lambda \in \mathbb{R}$ .

ধরা যাক  $f: \mathbb{R} \rightarrow \mathbb{R}$  একটি নীরবচ্ছিন্ন অপেক্ষক যা সন্তুষ্ট করে  $f(x+y) = f(x) + f(y)$ ,  
 $\forall x, y \in \mathbb{R}$  তাহলে দেখাও যে,  $f(x) = \lambda x$ ,  $\lambda \in \mathbb{R}$  এর জন্য।

(c) State and prove Leibnitz's theorem.

7

Leibnitz's উপপাদ্যটি বিবৃত এবং প্রমাণ কর।

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## COOCH BEHAR PANCHANAN BARMA UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2020, held in 2021

### PHYSICS (PRACTICAL)

### MECHANICS LAB

### GE-3

Time Allotted: 1 Hour

Full Marks: 15

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*All symbols are of usual significance.*

**Answer any one question from the following**

15×1=15

নিম্নলিখিত যে-কোন একটি প্রশ্নের উত্তর দাও

1. Explain the experimental steps, with the working formula and necessary schematic diagram, to determine the value of the acceleration due to gravity,  $g$  using Bar-Pendulum. 15  
 দশ দোলকের সাহায্যে অভিকর্ষজ ত্বরণের ( $g$ ) মান নির্ণয়ের ক্ষেত্রে প্রয়োজনীয় মূলতত্ত্ব এবং পরীক্ষা পদ্ধতি রেখাচিত্রসহ ব্যাখ্যা কর।
2. Explain the experimental procedure with the help of working formula and necessary schematic diagrams to determine the Moment of Inertia of a Metallic bar about an axis passing through the centre of gravity or the Moment of Inertia of a Flywheel. 15  
 প্রয়োজনীয় মূলতত্ত্ব ও রৈখিক চিত্রের সাহায্যে ফ্লাইহুইলের জড়তা ভ্রামক নির্ণয় করার পরীক্ষা পদ্ধতি ব্যাখ্যা কর অথবা ধাতব দণ্ডের ভরকেন্দ্রগামী ও দণ্ডের দৈর্ঘ্যের সাথে লম্ব অক্ষের সাপেক্ষে জড়তা ভ্রামক নির্ণয় কর। পরীক্ষা পদ্ধতি ব্যাখ্যা কর।

—x—



## COOCH BEHAR PANCHANAN BARMA UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2020, held in 2021

### PHYSICS

### MECHANICS

### GE-3

Time Allotted: 2 Hours

Full Marks: 25

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**Answer any one question from the following**

25×1 = 25

নিম্নলিখিত যে-কোন একটি প্রশ্নের উত্তর দাও

1. Show that the average K.E. of a particle executing simple harmonic motion is equal to the average P.E. of the particle. Also show that the total energy remains conserved during the simple harmonic motion. Classify the possible types of damping appearing in simple harmonic motion. 10+10+5

দেখাও যে, সরল দোলগতিতে থাকা একটি কণার গড় গতিশক্তি তার গড় স্থিতিশক্তির সাথে সমান। আরও দেখাও যে, মোট শক্তি সর্বদা ধ্রুবক থাকে। কত প্রকারের বাধাপ্রাপ্ত সরল দোলগতি হওয়া সম্ভব তার শ্রেণীবিভাগ কর।

2. Write down Hooke's Law. Explain Rigidity modulus. What is Poisons Ratio? Calculate the work done in stretching a wire. 5+5+5+10

হুক এর সূত্র বিবৃত কর। কৃন্তন গুণাঙ্ক ব্যাখ্যা কর। পয়শন-এর অনুপাত বলতে কী বোঝা ? একটি তারের দৈর্ঘ্য বৃদ্ধি করতে কত কাজ করতে হয়, তা নির্ণয় কর।

—x—

**COOCH BEHAR PANCHANAN BARMA UNIVERSITY**

B.Sc. Honours 3rd Semester Examination, 2020, held in 2021

**ZOOLOGY (PRACTICAL)****ANIMAL DIVERSITY****GE-3**

Time Allotted: 1 Hour

Full Marks: 15

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Candidates are required to give their answers in their own words as far as practicable.*

**Answer any one question from the following**

15×1 =15

1. Write down the identifying characters of the following specimens:

5×3 =15

- (a) *Amoeba* sp.
- (b) *Balanoglossus* sp.
- (c) *Chamaelion* sp.

2. Write down the identifying characters of the following specimens (any **three**):

5×3 =15

- (a) *Daphnia* sp.
- (b) *Petromyzon* sp.
- (c) *Cavia* sp.
- (d) Trochophore larva.

—x—

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B.Sc. Honours 3rd Semester Examination, 2020, held in 2021

**ZOOLOGY****ANIMAL DIVERSITY****GE-3**

Time Allotted: 2 Hours

Full Marks: 25

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25×1 = 25

1. Describe the life cycle of *Taenia solium* with a proper diagram. Mention the systematic position of it. Write about the parasitic adaptations of *Taenia solium*. Differentiate between Pseudocoelomate and Eucoelomate. 12+5+6+2=25
2. What do you mean by Ambulacral system? Describe the water vascular system of starfish with proper diagram. What are the functions of air sacs in birds? Mention any four differences between the poisonous and nonpoisonous snakes. 2+12+5+6=25

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**COOCH BEHAR PANCHANAN BARMA UNIVERSITY**

B.Sc. Honours 3rd Semester Examination, 2020, held in 2021

**PHYSIOLOGY (PRACTICAL)****ENVIRONMENTAL POLLUTION AND HUMAN HEALTH LAB****GE-3**

Time Allotted: 1 Hours

Full Marks: 15

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.***Answer any one from the following**

15×1=15

1. Write in brief the principle and procedure of estimation of dissolved oxygen in pond water sample. 15
2. Describe the principle and procedure of estimation of pH of soil sample. 15

—x—



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**PHYSIOLOGY**

**ENVIRONMENTAL POLLUTION AND HUMAN HEALTH LAB**

**GE-3**

Time Allotted: 2 Hours

Full Marks: 25

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

**Answer any one from the following**

25×1 = 25

1. Write short notes on:

5×5 = 25

- (a) Different layers of the atmosphere
- (b) Acid rain
- (c) Ozone hole
- (d) Green house effect
- (e) Global warming.

2. Describe the types and causes of water pollution. Write about some health hazards related to water pollution.

15+10

—x—