CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. THIRD SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023
PHYSICS
Wave Motion and Optics

Duration:2 Hours   **Max Marks:60**

PART - A

Answer any five questions, selecting minimum of one question from every unit: **5×9=45**

UNIT I

1. a) Why is transverse wave motion possible in solids and on the surface of liquids?

   b) Derive an expression for a simple harmonic wave.   **(2+7)**

2. a) How does pressure and temperature affect the velocity of sound?

   b) With neat diagram explain frequency of vibrations in a rod clamped at one end.

                                          (2+7)

UNIT II

3. a) What is linear homogeneous equation of motion? Explain with an example.

   b) Write an expression for the resultant motion, when two perpendicular waves from harmonic oscillator superimpose and discuss the various cases.   **(2+7)**

4. a) What is absorption coefficient of a material? Explain.

   b) Explain in detail factors affecting the acoustics of a building and write the requisites for good acoustics.   **(2+7)**

UNIT III

5. a) What is interference of light? What are interference fringes?

   b) What is interference of light? Describe Young's double slit experiment in order to demonstrate the phenomenon of interference of light.   **(2+7)**

6. a) Why do we observe colours on soap bubbles? On what factors do the colours observed on a soap bubble depend?

b) Explain with a ray diagram, the phenomenon of interference at a thin film due to reflected light and derive an expression for optical path difference.   (2+7)

UNIT IV

7 a) Give any two differences between a zone plate and a convex lens.

b) Distinguish between resolving power and dispersive power of a grating. Deduce an expression for the dispersive power of a plane transmission grating.   (2+7)

8 a) What is a half wave plate? Give the expression for the thickness of a half wave plate.

b) Define specific rotation of solution. With a neat diagram, describe how specific rotation of a solution is determined using a polarimeter.   (2+7)

PART - B

Answer any three questions: **3×5= 15**

9 An addition of 30 kg to the tension of a string of a sonometer wire changed its frequency to three times its original frequency. What is the original frequency? Given linear density of the wire is 1.78×10^{-3} kg/m, length of the sonometer wire is 0.35 m

10 A hall of volume 5500 m^3 is found to have a reverberation time of 2.3s. The sound absorbing surface of the hall has an area of 750m^2. Calculate the average absorption coefficients.

11 In a Michelson interferometer 200 fringes cross the field of view when the movable mirror is displaced through 0.05896 mm. Calculate the wavelength of the monochromatic light used.

12 Calculate the thickness of a double refracting plate capable of producing a path difference of $\frac{\lambda}{4}$ and $\frac{\lambda}{2}$ between e and o rays λ = 5890 A˚ , n_o = 1.53 and n_e = 1.54.

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. THIRD SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023

BOTANY

Plant Anatomy and Development Biology

Duration:2 Hours   **Max Marks:60**

I. Answer any Five of the following :   (5×2= 10 Marks)

1. What are intercalary meristems? Mention its position in plants.

2. What are aerenchyma? Mention its significance.

3. Define heart and sap wood.

4. Define exarch and endarch conditions.

5. What is Phyllotaxy? Mention thetypes.

6. Define Differentiation.

7. Draw a neat labeled diagram of mature ovule.

8. Draw a neat labeled diagram of pollen grain.

II. Answer any FOUR of the following :   (4×5= 20 Marks)

9. Explain different layers of cell wall.

10. Explain the structure of a tracheid.

11. Write the difference between dicot stem and monocot stem.

12. Mention the significance of nodal anatomy.

13. Explain cellular endosperm formation.

14. Write a note on self pollination.

15. Explain the structure of seed structure.

16. Mention the contributions of B. G. L. Swamy.

III. Answer any THREE of the following :   (3×10= 30 Marks)

17. Explain (i) Histogen theory (ii) Tunica corpus theory

18. Describe scenescence in plants.

19. Explain the transverse section of monocot root.

20. Mention the advantages and disadvantages of self pollination.

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. THIRD SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023

STATISTICS

Calculus and Probability Distributions - II

Duration:2 Hours   **Max Marks:60**

Answer any THREE of the following :   **(3×2= 06)**

1. If $f(x) = x^n + a$ then what is $\frac{d}{dx} f(x)$ at x=1.

2. How do we apply Jacobian Matrix in the transformation of Random Variables?

3. What is the relationship between Standard Deviation and Standard Error?

4. Define autocorrelation function?

5. Give examples for upward trend and Downward trend.

Answer any FOUR of the following in not more than a page each :   **(4×6= 24)**

6. Prove that $\Gamma(1/2) = \sqrt{\pi}$.

7. If X~U(0,1) , find the distribution of Y=-2lnx and identify the distribution.

8. If $\bar{X}$ is the AM of random sample of size n from a large population whose mean is μ and variance is σ^2 .Show that $E(\bar{X})=\mu$ and $V(\bar{X}) = \sigma^2/n$

9. Derive an expression for mean of F Variate with n_1 and n_2 degrees of freedom.

10. Briefly explain seasonal component of time series data with examples.

11. How do you generate random observations from Uniform Distribution?

Answer any THREE of the following in not more than two page each :   **(3×10= 30)**

12. Solve $\int_0^\infty \frac{y}{(1+y^3)^2} \, dy$

13. Suppose X~E $(\frac{1}{\theta})$, deduce the distribution of Y=nX(n) and Y=nX(1).

14. Derive an expression for the p.d.f of Chi Square Variate with n degrees of freedom.

15. What is the relationship between t distribution and F distribution? Justify.

16. How do you apply Ratio to trend method to obtain seasonal indices? Explain.

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. THIRD SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023
MICROBIOLOGY
Microbial Diversity

Duration:2 Hours   **Max Marks:60**

SECTION - A

Answer the following strictly observing the internal choice provided: **4×5=20**

UNIT 1

1) Write a note on MPN method as a measue of microbial diversity.

OR

2) Mention few economic values of microbial diversity.

UNIT 2

3) Write a note on Syphilis.

OR

4) Write a note on the morphology and cultural characters of Escherichia coli.

UNIT 3

5) Write briefly on morphology of fungi.

OR

6) Write briefly on types of amoeba based on the appearance of pseudopods.

UNIT 4

7) Write briefly on the Symptoms and related Serious medical conditions of Covid 19.

OR

8) Write a short note on Prions.

SECTION - B

Answer the following strictly observing the internal choice provided: **4×10=40**

UNIT 1

9) Define biodiversity and explain the concept of biodiversity in detail.

OR

10) Describe in detail Numerical taxonomy.

UNIT 2

11) Explain in detail the general characters of prokaryotes.

OR

12) Give a general acccount of Cyanobacteria with special reference to Spirulina.

UNIT 3

13) Define eukaryotes. Explain the features of an eukaryotic cell with a neat labelled diagram.

OR

14) Write in detail about Chlorella with diagram.

UNIT 4

15) Explain the cultivation of viruses using chick embryo method and Tissue culture method.

OR

16) Explain in detail about Tobacco Mosaic Virus with a neat labelled diagram.

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21ZOOC301   Reg No   :   ....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. THIRD SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023
ZOOLOGY
Molecular Biology, Bio instrumentation and Techniques in Biology

Duration:2 Hours   **Max Marks:60**

SECTION - A

Answer the following strictly observing the internal choice provided: **4×5=20**

UNIT 1

1) Describe the steps in the termination process of transcription n eukaryotes.

OR

2) List the requirements of translation.

UNIT 2

3) Explain the role of Histone modifications and DNA methylation.

OR

4) What is hnRNP? Write thier significance.

UNIT 3

5) What is microscopy? What are the principle and applications of light microscopy?

OR

6) Write a short note on the classification of chromatography.

UNIT 4

7) Write a short note on pH meter.

OR

8) Write a short note on spectroscopy.

SECTION - B

Answer the following strictly observing the internal choice provided: **4×10=40**

UNIT 1

9) Give an account on
   a) degeneracy of codons   b) initiation codons   c) terminator codons

OR

10) With a neat labelled diagram explain the Watson and Crick Model of DNA.

UNIT 2

11) Explain post translational modifications. Emphasize on the various enzymes involved in the processes.

OR

12) Explain the process of ubiquitin dependent protein degradation pathway.

UNIT 3

13) Explain the principle and different types of centrifugation.

OR

14) Differentiate between fluorescence microscope and confocal microscope. Mention its applications.

UNIT 4

15) Give a detailed account of Agarose gel electrophoresis.

OR

16) What is PCR? Comment on Taq polymerase and PCR primers.

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. THIRD SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023

MATHEMATICS

Ordinary Differential Equations and Real Analysis - I

Duration:2 Hours   **Max Marks:60**

PART - A

I. Answer any 6 questions. Each question carries 2 marks: **(2×6= 12 Marks)**

    a. Check whether the differential equation $(6x + y^2)dx + y(2x - 3y)dy = 0$ is exact or not.

    b. Find the integrating factor to solve the differential equation
$$2y(x + y + 2)dx + (y^2 - x^2 - 4x - 1)dy = 0$$

    c. Solve : $(D^2 + 2D - 8)y = 0$

    d. Find the particular integral of $(D^2 + 64)y = \sin 8x$.

    e. Find whether the sequence $\left\{ \frac{1+2+....+n}{n^2} \right\}$ converges or diverges?

    f. Check whether the sequence $\left\{ \frac{n}{2n+1} \right\}$ is monotonic or not.

    g. Check whether the series $\sum_{n=1}^{\infty} \frac{1}{n^5}$ is convergent or divergent.

    h. Check whether the series $\sum_{n=1}^{\infty} (-1)^{n+1} \left(\frac{-4}{3} \right)^n$ is absolutely converges.

PART - B

2. Answer any 2 questions. Each question carries 6 marks: **(6×2= 12 Marks)**

    a. Solve: $(y^2 - 2xy + 6x)dx - (x^2 - 2xy + 2)dy = 0$

    b. Solve:$(x^2 + y^2 + 1)dx + x(x - 2y)dy = 0$

    c. Find the general and singular solution of $y = px - p^5$

    d. Find the orthogonal trajectories of the family of straight lines $x^2 + y^2 = c^2$

PART - C

3. Answer any 2 questions. Each question carries 6 marks: **(6×2= 12 Marks)**

    a. Solve :$(D^2 - 4D - 5)y = 4 \cos 3x + e^{3x}$

    b. Solve : $(D^2 + D - 2)y = x^2 + 2$.

c. Solve :$(D^2 - 1)y = secxtanx$ by variation of parameters method.

d. Solve:$x^2y_2 + 2xy_1 = 6x^2 + 2x + 1$.

PART - D

4. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. State and prove comparison test for convergence of a series.

b. Prove that $\lim_{n\to\infty}\left\{\frac{1}{\sqrt{n^2+1}} + \frac{1}{\sqrt{n^2+2}} +\ldots+\frac{1}{\sqrt{n^2+n}}\right\}$ converges to 1 by using Sandwich theorem.

c. Check whether the following series are convergent or divergent .
   (i) $\sum_{n=1}^{\infty}\left(\frac{1}{2n} - \frac{1}{3n}\right)$ (ii) $\sum_{n=1}^{\infty}\frac{1}{2}\left(\frac{3}{4}\right)^n$

d. Check whether the following series are convergent or divergent .
   (i) $\sum_{n=1}^{\infty}\frac{1}{n2^n}$ (ii) $\sum_{n=1}^{\infty}\frac{n!}{(2n)!}$

PART - E

5. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. Determine whether the series $\sum_{n=1}^{\infty}\frac{\ln n}{n}$ is convergent or divergent using integral test.

b. Determine whether the series $\sum_{n=1}^{\infty}(-1)^n\frac{1}{\ln n}$ is absolutely convergent or conditionally convergent.

c. Determine whether series $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{n^2}{n!}$ is convergent or divergent.

d. Determine whether the series $\sum_{n=1}^{\infty}(-1)^n\frac{3^{2n+1}}{n^{2n}}$ is convergent or divergent.

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21CHEC301

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. THIRD SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023

CHEMISTRY

Analytical and Organic Chemistry - II

Duration:3 Hours   Max Marks:60

PART - A

I. Answer any SIX from the following: (2×6= 12 Marks)

1. What is wave number ? Write its unit.

2. Define absorbance.

3. Define the term retention factor.

4. Define the term separation factor in solvent extraction.

5. How is an isopropyl cation formed?

6. What is Claisen Schmidt reaction?

7. What is meant by conformation ?

8. Why is meso tartaric acid optically inactive?

PART - B

II.Answer any SIX of the following choosing at least one question from each unit:

(6×8= 48 Marks)

UNIT I

9. a. Explain the instrumentation and working of double beam spectrophotometer.
   b. Explain the principle of spectrophotometry. (5+3)

10 a. Derive an expression for Beer-Lambert's law.
   b. Explain the principles of Nephelometry and Turbidimetry. (4+4)

UNIT II

11. a. Explain the classification of chromatographic method based on stationary and mobile phase.
   b. Explain the different types of exchange resins with an example. (4+4)

12 a. Briefly explain the procedure involved in paper chromatography.
   b. Write a note on continuous extraction. (5+3)

UNIT III

13. a. Write a note on 'Stereochemical & Kinetic studies'.

    b. What is Isotope labelling? Give an example. (5+3)

14 a. Write a note on the stability of carbenes

    b. What are nitrenes? Give one method of formation of nitrenes. (5+3)

UNIT IV

15. a. Write and explain geometrical isomerism in oximes.

    b. Explain cis- trans isomerism with examples. (5+3)

16 a. What is a Racemic modification and give one method of formation of racemic modification.

    b. Explain D & L notation with an example. (4+4)

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22NHEC301   Reg No   :   ....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. THIRD SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023
NUTRITION AND HEALTH EDUCATION
Introduction to Food Safety

Duration:2 Hours   Max Marks:60

SECTION - A

Answer the following strictly observing the internal choice provided: 4×5=20

UNIT 1

1) Discuss the significance of personal hygiene in food safety.

OR

2) Describe the importance of food packaging in protecting food from contamination.

UNIT 2

3) Explain the concept of food safety and its importance in public health.

OR

4) Explain the various measures to prevent food borne illnesses.

UNIT 3

5) Define food adulteration according to the Prevention of Food Adulteration Act.

OR

6) Describe the essential information provided by nutritional labels on packaged foods.

UNIT 4

7) Write on the role of ISO in maintaining food standard.

OR

8) What is the main purpose of the Prevention of Food Adulteration (PFA) Act in India, and how does it protect consumers from unsafe food products?

Answer the following strictly observing the internal choice provided: 4×10=40

UNIT 1

9) Provide guidelines for proper food storage practices.

OR

10) Discuss the sources of biological contamination in the food. How can we prevent such foodborne illnesses?

UNIT 2

11) Describe the seven principles of HACCP.

OR

12) Explain the types of food additives used in food industry along with their functions in food products.

UNIT 3

13) Write a note on adulteration of following food products:
i) cereals and grains ii) spices and condiments

OR

14) Explain the causes and symptoms of Aflatoxin intoxication. What preventive measures can be taken to avoid this?

UNIT 4

15) Write in detail on i) Fruit Products Order (FPO)
ii) Milk and Milk Product Order (MMPO)

OR

16) Write a note on Codex Alimentarius. Add a note on their need and key provisions.

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. THIRD SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023
COMPUTER SCIENCE

Object Oriented Programming Concepts and Programming in Java

Duration:2 Hours   **Max Marks:60**

PART A

Answer any FIVE questions: (5×2= 10)

1) What is encapsulation?

2) Give an example to declare and create a two dimensional array.

3) What is inheritance?

4) What are local applets?

5) When do we declare a class final?

6) What are the conventions followed in java for naming identifiers? Give examples.

PART B

Answer any FIVE questions :   (5×6= 30)

7) Explain nested if statement and else if ladder with syntax and example.

8) With an example explain how to create objects and access class members.

9) Explain the basic concepts of exception handling with syntax.

10) Explain how threads can be implemented using the 'runnable' interface.

11. Write a note on Java and World Wide Web.

12. Explain any six methods of the class Vector with examples.

PART C

Answer any TWO questions :   (2×10= 20)

13. Write a note on: a) Type casting   b) Constants

14. Explain with syntax and example the following: a) while loop   b) do...while loop

15. With an example explain how to create, access and use a user defined package.

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21CSCC501   Reg No   :   ....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIFTH SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023
COMPUTER SCIENCE
Programming in Python

Duration:2 Hours   Max Marks:60

PART A

Answer any FIVE questions: (5×2= 10)

1) Write any two characteristics of Python.

2) How do you write multi line comments in Python? Give an example.

3) What do you mean by arbitrary arguments? Give an example.

4) How do you convert lists to tuple? Give an example.

5) What is an exception? List any two.

6) How do you write data into a file? Give an example.

PART B

Answer any FIVE questions :   (5×6= 30)

7) Explain break and continue statement in Python with syntax and example.

8) Explain a) remove()   b) append()   c) tolist() methods of an array with an example.

9) Explain concatenation and comparison of strings with an example.

10) Explain with syntax and example a) clear() b) union()   c) issuperset() methods of sets.

11) Explain method overriding in multiple inheritance with an example.

12) Write a note on   a) NumPy   b) Pandas

PART C

Answer any TWO questions :   (2×10= 20)

13) Explain Arithmetic and Relational operators in Python with an example.

14) Explain a) max()   b) count()   c) insert()   d) pop()   e) sort() methods of lists with syntax and example.

15) Write a program in Python to create a database "library" and perform insert operation on the table "books" with columns: bookid, title and author

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