

FACULTY OF SCIENCE**B.Sc. Honors in Computer Science (CBCS) I - Semester Examination, December 2024****Subject : Calculus and Differential Equations****Time: 3 Hours****Max. Marks: 80****PART – A****Note : Answer any Eight questions.****(8x4=32 Marks)**

1. If $y = \cos^4 x$ then find $\frac{d^2 y}{dx^2}$.
2. If $y\sqrt{1-x^2} + x\sqrt{1-y^2} = 1$, then find $\frac{dy}{dx}$.
3. Find $\frac{d^{10}}{dx^{10}} \left(\frac{1}{3x+5} \right)$.
4. Solve $\frac{dy}{dx} - \frac{2y}{(x+1)} = (x+1)^3$.
5. Solve $(ye^{-xy}) dx + (xe^{-xy} + 2y) dy = 0$.
6. Solve $xy^2 dy - (x^3 + y^3) dy = 0$.
7. Solve $p^2 - 9p + 14 = 0$ where $p = \frac{dy}{dx}$.
8. Solve $\frac{dy}{dx} - \frac{dx}{dy} = \frac{x}{y} - \frac{y}{x}$.
9. Find the singular solution of $y = xp + \frac{a}{p}$.
10. Solve $(D^2 + 1)y = 0$ where $D \equiv \frac{d}{dx}$.
11. Find a particular integral of $(D^3 - 1)y = e^x + e^{2x}$.
12. Solve $(D^2 + 4)y = \sin 2x$.

PART – B**Note : Answer ALL questions.****(4x12=48 Marks)**

- 13.a) (i) Find $\frac{d^n}{dx^n}(\sin^4 x)$. (ii) Find $\frac{d^n}{dx^n}(x^2 e^{2x} \cos x)$.

OR

- b) If $y = (x^2 - 1)^n$, then show that $(x^2 - 1)y_{n+2} + 2x y_{n+1} - n(n+1)y_n = 0$.

- 14.a) Solve $\frac{dy}{dx} = x y + x^3 y^2$.

OR

- b) Solve $(x^3 y^2 + x) dy + (x^2 y^3 - y) dx = 0$.

- 15.a) Solve $xy p^2 - (x^2 + y^2)p + xy = 0$ where $p = \frac{dy}{dx}$.

OR

- b) Solve $xp^2 + x = 2yp$.

- 16.a) Using the method of variation of parameters, solve $(D^2 + 9)y = \sec 3x$.

OR

- b) Solve $x^3 \frac{d^3 y}{dx^3} + 2x^2 \frac{d^2 y}{dx^2} + 2y = 10 \left(x + \frac{1}{x} \right)$.

FACULTY OF SCIENCE**B.Sc. Honors in Biomedical Sciences (CBCS) I - Semester Examination, December 2024****Subject : Medical Endocrinology and Diagnostics****Time: 3 Hours****Max. Marks: 80****Part-A****Note: Answer any eight questions.****(8x4 = 32 Marks)**

1. Discuss the hypo and hyper secretion of hormone effects with an example.
2. Give an account of the types of endocrine cells.
3. Causes and consequences of Cushing's disease.
4. Structure of hypothalamus and its endocrine function.
5. Define Insulin resistance and its causes.
6. Give an account of post menopausal effects.
7. Explain GLP and ISO.
8. Methods for biological sample preservation.
9. What are the blood drawing methods?
10. Diagnosis of Bacterial diseases.
11. Applications of Gel electrophoresis.
12. EMB agar media and its uses.

Part-B**Note: Answer all questions.****(4x12 = 48 Marks)**

13. (a) Explain the general mechanism of hormone action and role of hormone receptors.
(OR)
(b) Give a detailed account of the endocrine disorders during adolescence.
14. (a) Write about the production, functions and deficiency disorders of thyroid hormones.
(OR)
(b) Explain the estrogen functions and related disorders.
15. (a) Write about the guidelines for sample collection, transport and analysis.
(OR)
(b) Describe the composition of blood, blood cells and normal counts.
16. (a) Give an account of the physical and chemical methods of sterilization.
(OR)
(b) Discuss the principles and applications of ELISA and PCR in medical diagnostics.
