



PBK-003-0011005

Seat No. _____

B. Sc. (Sem. I) (CBCS) (W.I.F. 2016) Examination

November / December - 2018

Mathematics - 01 (A)

(Calculus) (New Course)

Faculty Code : 003

Subject Code : 0011005

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

Instruction:1.All question are compulsory.

2.Numbers written in the right indicate marks of the question.

1 A. Answer the following questions. 4

1. If $f(x) = \sin x, \forall x \in [0, \pi]$ then find the value of 'c' in Roll's theorem.
2. Write expansion of e^x in term of x .
3. Write statement of Cauchy 's theorem.
4. Find the coefficient of x^4 in expansion of $\cos x$.

B. Answer any one of two. 2

1. Expand $\sin x$ in ascending power of $(x - \frac{\pi}{2})$.
2. Expand $\log x$ in ascending power of $(x - 1)$.

C. Answer any one of two. 3

1. Show that for $-1 < x < 5$,function $f(x) = x^3 - 6x^2 - 15x + 3$ is strictly decreasing.
2. Find the value of θ of lagrange's formula ,where $f(x) = x^2 - 2x + 3, a = 1, h = \frac{1}{2}$.

D. Answer any one of two. 5

1. State and prove Lagrange's mean value theorem.
2. Show that $\frac{x}{1+x} < \log_e(1+x) < x$, where $x > 0$.

2. A. Answer the following questions.

4

1. Evaluate $\lim_{x \rightarrow 0} \frac{\tan x}{2x}$.

2. Evaluate $\lim_{x \rightarrow 1} \frac{x^2 + 2x - 3}{x^2 + 3x - 4}$.

3. Find the order and degree of differential equation

$$\frac{d^2 y}{dx^2} = \left[1 + \left(\frac{dy}{dx} \right)^2 \right]^{\frac{3}{2}}.$$

4. Solve the differential equation $ydx + xdy = 0$.

B. Answer any one of two.

2

1. Evaluate $\lim_{x \rightarrow 1} \frac{\log x}{x - 1}$.

2. Solve $e^x \tan y dx + (1 - e^x) \sec^2 y dy = 0$.

C. Answer any one of two.

3

1. Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} (\sec x - \tan x)$.

2. Solve $\frac{dy}{dx} + y \cot x = 4x \operatorname{cosec} x$.

D. Answer any one of two.

5

1. Evaluate $\lim_{x \rightarrow 0} \left(\cot^2 x - \frac{1}{x^2} \right)$.

2. Solve $y^2 + x^2 \frac{dy}{dx} = xy \frac{dy}{dx}$.

3 A. Answer the following questions.

4

1. Solve $y = px - e^p$, where $p = \frac{dy}{dx}$.

2. Solve $p^2 - 7p + 12 = 0$, where $p = \frac{dy}{dx}$.

3. Check whether the differential equation $ydx + (y - x)dy = 0$ is exact or not?

4. Find the integrating factor of differential equation $x \frac{dy}{dx} - y = 2x^2$.

B. Answer any one of two. 2

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

2. Solve $yp - x = 0$, where $p = \frac{dy}{dx}$.

C. Answer any one of two. 3

1. Solve $x^2(y - px) = yp^2$, where $p = \frac{dy}{dx}$.

2. Solve $y - 2px = \tan^{-1}(xp^2)$, where $p = \frac{dy}{dx}$.

D. Answer any one of two. 5

1. Solve $(y^2e^{xy^2} + 4x^3)dx + (2xye^{xy^2} - 3y^2)dy = 0$.

2. Solve $p^3 - xp - y = 0$, where $p = \frac{dy}{dx}$.

4 A. Answer the following questions. 4

1. Evaluate $\frac{1}{D} x^2$.

2. Define Auxiliary equation.

3. Find C.F. of $(D^2 + 9)y = \sin x$.

4. Evaluate $\frac{1}{D-1} e^x x$.

B. Answer any one of two. 2

1. Find $\frac{1}{D^2} 6x^2$.

2. Solve $(D^3 - 9D^2 + 27D - 27)y = 0$.

C. Answer any one of two. 3

1. Solve $\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 6y = e^{2x}$.

2. Solve $\frac{d^4y}{dx^4} - a^4y = 0$, where a is constant.

D. Answer any one of two. 5

1. In usual notation prove that $\frac{1}{f(D)} e^{ax} V = e^{ax} \frac{1}{f(D+a)} V$, where V is a function of x .

2. Solve $(D^3 - D^2 - 6D)y = 1 + x^2$.

5 A. Answer the following questions. 4

1. Evaluate $\frac{1}{D+1} 2x$

2. Find P.I.(Particular integral) of $\frac{d^3 y}{dx^3} - \frac{4}{x} \frac{d^2 y}{dx^2} + \frac{5}{x^2} \frac{dy}{dx} - \frac{2y}{x^2} = 1$.
3. Find P.I.(Particular integral) of $x \frac{d^3 y}{dx^3} + \frac{d^2 y}{dx^2} = \frac{1}{x}$.
4. Find C.F.(Complementary function) of $\frac{d^2 y}{dx^2} + \frac{1}{x} \frac{dy}{dx} = \frac{12 \log x}{x^2}$.

B. Answer any one of two. 2

1. Find C.F.(Complementary function) of $x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + y = 2 \log x$.
2. Find P.I.(Particular integral) of $(x^2 D^2 + 5xD + 4)y = x^4$.

C. Answer any one of two. 3

1. Solve $x^2 \frac{d^2 y}{dx^2} + y = 3x^2$.
2. Solve $x^2 \frac{d^2 y}{dx^2} - 2x \frac{dy}{dx} + 2y = x^3$.

D. Answer any one of two. 5

1. Solve $(x^2 D^2 - 3xD + 4)y = x^m$.
 2. Solve $x^3 \frac{d^3 y}{dx^3} - x^2 \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} - 2y = x^3 + 3x$.
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