

QP CODE: D4BAM2402	(Pages: 2)	Reg. No :
		Name :
FOURTH SEMESTER FYUGP EXAMINATION, APRIL 2026		
Discipline Specific Core (DSC) Courses - Major		
AMA4CJ204 : DIFFERENTIAL EQUATIONS		
(Credits: 4)		
Time: 2 Hours	Maximum Marks: 70	
Section A		
Answer the following questions. Each carries 3 marks (Ceiling: 24 marks)		
1. Define linear and nonlinear differential equations. Give an example for each.	BL1	CO1
2. Find the value of b for which the differential equation. $(xy^2 + bx^2y)dx + (x + y)x^2dy = 0$ is exact.	BL2	CO1, CO2
3. Write down differential equation of the form $\frac{dy}{dt} = ay + b$ so that its all solutions approach $y = 3$ as $t \rightarrow \infty$.	BL2	CO1
4. Find the general solution of $y'' + 5y' + 6y = 0$	BL1	CO1, CO2
5. Determine whether the pair functions $f(t) = t^2 + 5t$, $g(t) = t^2 - 5t$ is linearly independent or not.	BL2	CO2
6. Find the fundamental period of i) $\sin x$ ii) $\sin 2x$.	BL2	CO4
7. Find the particular integral of $y'' + y = \sin x$ using the method of undetermined coefficients, assuming $g(x) = \sin x$ is a fundamental solution of the corresponding homogeneous differential equation.	BL2	CO1, CO2
8. Verify whether the functions $ x^3 $, $x \cos nx$ are odd, even or neither odd nor even.	BL2	CO4
9. Evaluate the laplace transform of i) $f(t) = 1, t > 0$ ii) $f(t) = e^{at}, t > 0$.	BL2	CO3
10. Find the inverse Laplace transform of $\frac{4}{(s - 1)^3}$.	BL2	CO3
(PTO)		

Section B

Answer the following questions. Each carries 6 marks (Ceiling: 36 Marks)

11.	Solve $i) \frac{dr}{d\theta} = \frac{r^2}{\theta}, r(1) = 2$ $ii) y' = \frac{x(x^2+1)}{4y^3}, y(0) = \frac{-1}{\sqrt{2}}$	BL2	CO1, CO2
12.	Show that the initial value problem $y' = y^{\frac{1}{3}}, y(0) = 0$ does not contain unique solution.	BL1	CO1, CO2
13.	Find the Wronskian of solution of the differential equation $y'' + 5y' + 6y = 0$	BL1	CO1, CO2
14.	Find the solution of the initial value problem $y'' - 2y' + 5y = 0, y(\frac{\pi}{2}) = 0, y'(\frac{\pi}{2}) = 2$	BL2	CO2
15.	Find the general solution of $y'' + 4y = 3 \cos 2t$.	BL1	CO2
16.	Find the general solution of $y'' + 9y = 9 \sec^2 3t, 0 < t < \frac{\pi}{6}$.	BL2	CO2
17.	Find the Laplace transform of $f(t) = \int_0^t (t - \tau)^2 \cos 2\tau d\tau$.	BL2	CO3
18.	Find the inverse Laplace transform of $F(s) = \frac{e^{-2s}}{s^2 + s - 2}$.	BL2	CO3

Section C

Answer any one question. Each carries 10 marks (1 x 10 = 10 Marks)

19.	Solve the initial value problem $ty' + (t + 1)y = t, y(\ln 2) = 1$.	BL2	CO1
20.	Find the solution of the initial value problem $y'' + 2y' + 2y = 2t; y(0) = 1, y'(0) = 0$	BL2	CO3

CO : Course Outcome

BL : Bloom's Taxonomy Levels (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)