

SEMESTER	VI	QP CODE	6202
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P.R. GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
SEM END EXAMINATIONS APRIL -2025
III B.SC:MATHEMATICS: SPECIAL FUNCTIONS

TIME: 2 HRS

DATE&SESSION	03:04.2025 & AN	REG NO																MAX MARKS	50
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SECTION-I1

Answer any **THREE** of the following questions. And attempt one question from Each section
part Each question carries **TEN** marks
3X10=30Marks

PART-A

1. Derive the relationship between Gamma and Beta function?
2. Prove that $\Gamma\left(n + \frac{1}{2}\right) = \frac{1.3.5.....(2n-1)\sqrt{\pi}}{2^n}$, when n is a + ve intezer
3. Find the general solution of $y'' + (x - 3)y' + y = 0$ near $x = 2$

PART-B

1. State and Prove Rodrigues formula for $H_n(x)$
2. Prove that $\int_{-1}^1 [P_n(x)]^2 dx = \frac{2}{2n+1}$
3. Prove that $\sqrt{\frac{\pi x}{2}} J_{\frac{3}{2}}(x) = \frac{1}{x} \sin x - \cos x$

SECTION-II

Answer any **FOUR** of the following questions. Each question carries **FIVE** marks
4 X 5=20Marks

4. Show that $\Gamma\left(\frac{1}{2} + x\right) \Gamma\left(\frac{1}{2} - x\right) = \frac{\pi}{\cos \pi x}$
5. Evaluate $\int_0^1 \frac{dx}{\sqrt{-\log x}}$
6. Find the radius of the convergence of the series $\sum (-1)^n \frac{x^{2n+1}}{(2n+1)!}$
7. Solve by power series method $y' - y = 0$
8. Evaluate $\int_{-\infty}^{\infty} x e^{-x^2} H_n(x) H_m(x) dx$
9. Prove that $P_3(x) = \frac{1}{2}(5x^3 - 3x)$
10. Show that $J_{-\frac{1}{2}}(x) = \sqrt{\frac{\pi x}{2}} \cos x$