KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY (KIIT)
(Deemed to be University)
DEPARTMENT OF MATHEMATICS,SAS
Mathematics-II[MA-1004], Quiz Test-1, Session-2020-21

Roll. No._____,Name_____,Sec_____

Time-15 min **FM-10**

1. What is the radius of convergence of the series $\sum_{n=0}^{\infty} \frac{(-1)^n (x-1)^{3n}}{8^n}$?
   A. 8
   B. 3
   C. 2
   D. 4
2. If $P_m(x)$ is Legendre's polynomial then the value of $P_{100}(-1)$ is
   A. 0
   B. -1
   C. 1
   D. None of the above
3. The Bessel function $J_{\frac{1}{2}}(x)$ is
   A. $\sqrt{\frac{2}{\pi x}}\cos x$
   B. $\sqrt{\frac{2}{\pi x}}\sin x$
   C. $\sqrt{\frac{2}{\pi x}}\sin^2 x$
   D. $\sqrt{\frac{2}{\pi x}}\cos^2 x$
4. What are the roots of the indicial equation of $(x^2 - x)y'' - xy' + y = 0$?
   A. 0 and ½
   B. 1 and -1
   C. 0 and 2
   D. 0 and 1
5. What is one of the solutions of $(1 - x^2)y'' - 2xy' + 6y = 0$?
   A. $\frac{1}{2}(5x^3 - 3x)$
   B. $\frac{1}{2}(3x^2 - 1)$
   C. $\frac{1}{2}(3x^2 - x)$
   D. $\frac{1}{2}(5x^2 - 1)$
6. What is the interval of convergence of the series $\sum_{m=0}^{\infty} \frac{(-1)^m (x-1)^{2m}}{4^m}$?

   A) $-1 < x < 3$
   B) $1 < x < 4$
   C) $0 < x < 2$
   D) $-1 < x < 2$
7. If $P_m(x)$ is Legendre's polynomials then the value of $\int_{-1}^{1} P_7(x)P_9(x)\,dx$ is

   A) 0

B) 1

C) $\frac{2}{16}$

D) $\frac{3}{16}$

8. Which one of the following is the perfect replacement of $P_2(x)$ in terms of $P_0(x)$& $P_1(x)$ if $P_m(x)$ is the Legendre's polynomials.

A) $\frac{5}{2}xP_1(x) - \frac{1}{2}P_0(x)$

B) $\frac{5}{2}xP_1(x) + \frac{1}{2}P_0(x)$

C) $\frac{5}{2}xP_1(x) - \frac{3}{2}P_0(x)$

D) $\frac{5}{2}xP_1(x) + \frac{1}{2}P_0(x)$

9. If $J_n(x)$ is the Bessel's function of the first kind of order n then what is $\frac{d}{dx}(-x^{-3}J_3(x))$?

A) $x^{-3}J_4(x)$

B) $x^3J_2(x)$

C) $x^2J_2(x)$

D) $-x^{-3}J_4(x)$

10. What is the value of the integral $\int_0^\infty e^{-t^2}t^2dt$?

A) $\frac{\sqrt{\pi}}{4}$

B) $\frac{\sqrt{\pi}}{2}$

C) π

D) $\frac{\pi}{2}$

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