TEST 1 **FINAL EXAM FOR CALCULUS III - Semester 20212**

Subject Code: MI1134E. ICT-K66. Time: 90 Minutes

Note: Materials and textbooks are forbiden. Giám thị ký xác nhận mã đề thi

Prob 1. (2 points) Examine for convergence or divergence:

$$\text{a) } \sum_{n=1}^{\infty}\left(\frac{n+1}{\ln(n+1)}\right)^n \qquad \text{b) } \sum_{n=2}^{\infty}(-1)^n\frac{(n+1)\pi^n}{3^{n-1}-1}.$$

Prob 2. (1 point) Find the domain of convergence of the series of functions

$$\sum_{n=1}^{\infty}(-1)^n\frac{\sin^3 nx}{3^n-1}.$$

Prob 3. (3 points) : Solve the following problems:

a) $y'\cos y + 2x\sin x = 2x$.

b) $y'' - y' = 1 + e^x$.

c) $y'' + 2y' + y = \dfrac{e^{-t}}{1+t^2}$,

Prob 4. (2 points) Solve the following problems:

a)

$$y(t) = 2te^{-t} + e^t\int_0^t y(u)e^{-u}du.$$

b)

$$\begin{cases} y^{(3)} - 4y' &= \begin{cases} 0 & \text{if } 0 < x < 2 \\ 4 & \text{if } x > 2 \end{cases}, \\ y(0) = y'(0) &= 0,\ y''(0) = 4. \end{cases}$$

Prob 5. (2 points) a) Expand $f(x) = 2 - x,\ x \in (0,4)$ in a Fourier Cosine series with period 8 on $(0,8)$.

b) How should $f(x)$ be defined at $x = 0, x = 4$ and $x = 8$ so that this Fourier Cosine series will converge to $f(x)$ for $x \in [0,8]$. Applying to find the following sum $\sum\limits_{n=1}^{\infty}\dfrac{1}{n^2}$.

——THE END——

TEST 2 **FINAL EXAM FOR CALCULUS III - Semester 20212**

Subject Code: MI1134E. ICT-K66. Time: 90 Minutes

Note: Materials and textbooks are forbiden. Giám thị ký xác nhận mã đề thi.

Prob 1. (2 points) Examine for convergence or divergence:

$$\text{a) } \sum_{n=1}^{\infty}\left(\frac{n^2+1}{\ln(n^2+1)}\right)^n \qquad \text{b) } \sum_{n=2}^{\infty}(-1)^n\frac{(n+1)\pi^n}{5^{n-1}-1}.$$

Prob 2. (1 point) Find the domain of convergence of the series of functions

$$\sum_{n=1}^{\infty}(-1)^n\frac{\cos^2 nx}{2^n-1}.$$

Prob 3. (3 points) : Solve the following problems:

a) $y'\sin y + 4x\cos 2x = 4x$.

b) $y'' + y' = 1 + e^{-x}$.

c) $y'' - 2y' + y = \dfrac{e^{t}}{1+t^2}$,

Prob 4. (2 points) Solve the following problems:

a)

$$y(t) = 2te^{-2t} + e^{2t}\int_0^t y(u)e^{-2u}du.$$

b)

$$\begin{cases} y^{(3)} - 9y' &= \begin{cases} 0 & \text{if } 0 < x < 3 \\ 9 & \text{if } x > 3 \end{cases}, \\ y(0) = y'(0) &= 0,\ y''(0) = 9. \end{cases}$$

Prob 5. (2 points) a) Expand $f(x) = 4 - 2x,\ x \in (0,4)$ in a Fourier Cosine series with period 8 on $(0,8)$.

b) How should $f(x)$ be defined at $x = 0, x = 4$ and $x = 8$ so that this Fourier Cosine series will converge to $f(x)$ for $x \in [0,8]$. Applying to find the following sum $\sum\limits_{n=1}^{\infty}\dfrac{1}{n^2}$.

——THE END——