Higher Institute of Engineering **Prep. Year: Mid-Term Exam**
6th of October City **Mathematics (Calculus II)**
2nd Term: 2004/2005 **I** **Examiner: Dr. Mohamed Eid**

Answer the following questions: Time: 1 Hour

(1)Find $(AB)^{-1}$ where $A=\begin{bmatrix}1 & -2 & 2\\ 1 & 3 & 1\end{bmatrix}$, $B=\begin{bmatrix}1 & 2\\ 1 & 1\\ 2 & 3\end{bmatrix}$

(2)Compute the sum of the series $\sum_{r=1}^{n}\frac{r}{(r+1)(r+2)}$

(3)If $z_1=2-i$ $z_2=3+2i$. Find $z_1.z_2$ and z_1+z_2

(4)Test the series $\sum_{n=1}^{\infty}\frac{n}{3^n}$

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Answer the following questions: Time: 1 Hour

(1)Find $(AB)^{-1}$ if possible , where $A=\begin{bmatrix}1 & 2 & 1\\ 2 & -1 & 1\\ 3 & 1 & 2\end{bmatrix}$, $B=\begin{bmatrix}1 & 2 & 3\\ 0 & 1 & 1\\ 0 & 0 & 3\end{bmatrix}$

(2)Compute the sum of the series $\sum_{r=1}^{n}(r+1)(2r+1)$

(3)If $z_1=2-3i$ $z_2=3+i$. Find $z_1.z_2$ and z_1+z_2

(4)Test the series $\sum_{n=1}^{\infty}\frac{2^n}{n}$

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2nd Term: 2004/2005 **III** **Examiner: Dr. Mohamed Eid**

Answer the following questions: Time: 1 Hour

(1)Find A^{-1} if possible , where $A = \begin{bmatrix} 2 & 0 & 1 \\ -1 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$

(2)Using the binomial theorem, expand $\frac{3}{3-6x}$ as a power series.

(3)If $z_1 = 2 - 4i$ $z_2 = 5 + 2i$. Find $z_1 . z_2$ and $z_1 + z_2$

(4)Test the series $\sum_{n=1}^{\infty} \frac{n}{3+n^2}$

Ministry Of Higher Education **Prep. Year: Final Exam**
Higher Institute of Engineering **Mathematics: (Calculus II)**
6th of October City **Course Code, BAS 115**
Department of Basic Science **June, 13, 2005**

الامتحان مكون من (5) أسئلة مكتوبة فى صفحة واحدة و المطلوب الإجابة عن كل الأسئلة0 الزمن: 3 ساعات

(1)(a)Find AB and $(AB)^{-1}$ where $A=\begin{bmatrix} 2 & 0 & 1 \\ -1 & 7 & 1 \end{bmatrix}$, $B=\begin{bmatrix} 1 & 3 \\ 0 & 1 \\ 2 & -3 \end{bmatrix}$

(b)Compute the sum of the series $\sum_{r=1}^{n} \frac{2}{(r+2)(r+3)}$

(c)Test the series $\sum_{n=1}^{\infty} \frac{2^n}{n+1}$

(2)(a)Find the interval of convergence of the series: $\sum_{n=1}^{\infty} \frac{1}{n} x^n$

(b)Test the series $\sum_{n=1}^{\infty} \frac{2n+1}{n^2+n}$

(c)If $z_1 = 2-3i$, $z_2 = 3+i$ are complex numbers. Find $z_1.z_2$ and z_1+z_2

(3)(a)If $f(x,y)=x^2-y^2$. Show that $f_{xx}+f_{yy}=0$

(b)Obtain the extrema of the function: $f(x,y)=x^2+y^2+2x-4y$

(c)Find the extrema of the function: $f(x,y)=x^2+y^2$ subject to
g(x,y) = x + y – 6 = 0

(4)(a)Find the envelope of the curves $(x+\alpha)^2+y^2=1$

(b)Evaluate the integral $\int_0^2 \int_0^x (x+4y)dydx$

(5)Evaluate the following integrals:

(a) $\iint_D \sqrt{x^2+y^2}dydx$, where D is the region inside the circle $x^2+y^2=1$

(b) $\int_{(0,0)}^{(1,1)} (x^2+2y)\,dx+(2x-y^2)dy$, through the curves: (i) y = x (ii) y = x^2

(c) $\oint_C (2x+y)\,dx+(x-3y)dy$, where C is the circle $x^2+y^2=1$

Good Luck Dr. Mohamed H. Eid