Higher Institute of Engineering
6th of October City
Time 1 Hour

I

Prep. Year: Mid-Term Exam
2nd Term: 2005/2006
Mathematics (Calculus II)

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

(2)Compute the sum of the series $\sum_{r=1}^{20} \frac{1}{r(r+1)}$

(3)(a)If $z_1 = 2 - 3i$, $z_2 = 1 + 2i$. Find $z_1 \cdot z_2$ and $\overline{z_1 \cdot z_2}$

(b)Write the number $z = -3i$ in polar form

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

(5)If $f(x, y) = e^{2x} \cos 2y$. Show that $f_{xx} + f_{yy} = 0$

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II

Prep. Year: Mid-Term Exam
2^{nd} Term: 2005/2006
Mathematics (Calculus II)

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

(2)Compute the sum of the series $\sum_{r=1}^{20} \frac{1}{(2r-1)(2r+1)}$

(3)(a)If $z_1 = 2-3i$, $z_2 = 1+2i$. Find $z_1 . z_2$ and $\overline{z_1 + z_2}$

(b)Write the number $z = 1 + i$ in polar form

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

(5)If $f(x,y) = 3x + e^{2y}\sin 2x$. Show that $f_{xx} + f_{yy} = 0$

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III

Prep. Year: Mid-Term Exam
2^{nd} Term: 2005/2006
Mathematics (Calculus II)

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

(2)Compute the sum of the series $\sum_{r=1}^{20} r(r+1)(r+2)$

(3)(a)If $z_1 = 2-3i$, $z_2 = 2+i$. Find z_1/z_2 and $\overline{z_1+z_2}$

(b)Write the number $z = 2e^{3+i\frac{\pi}{2}}$ in rectangular form.

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

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

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, 12, 2006

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

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

(b)Test the series: (i) $\sum_{n=1}^{\infty} \frac{n}{n^4+4}$ (ii) $\sum_{n=1}^{\infty} \frac{(-1)^n n}{3^n}$

(2)(a)Write the Maclaurin series of the function: $f(x)=(3x+1)e^{2x}$

(b)Compute the sum of the series $\sum_{r=1}^{20} \frac{4}{(r+3)(r+4)}$

(c)Find z_1+z_2 and write it in polar form, where $z_1=2-3i$, $z_2=-1+4i$

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

(b)Obtain the maximum and minimum values of the functions:

(i) $f(x,y)=x^2+y^3-2xy+4$ (ii) $f(x,y)=e^{xy}$

(c)Find the envelope of the curves: $\alpha x^2+\frac{1}{\alpha}=y$

(4)Evaluate the integrals: (a) $\int_0^1\int_0^x (16xy)\,dy\,dx$

(b) $\iint_S dS$, where S is $x^2+y^2+z=4,\ z\geq 0$

(c) $\int_{(0,0)}^{(1,2)} (x^2+2y)\,dx+(3x+4y)\,dy$, through the curve $y=2x^2$

(5)(a)Find $\overline{U}+\overline{V}$, $\overline{U}.\overline{V}$, $\overline{U}x\overline{V}$ where $\overline{U}=2i+2j+k$ and $\overline{V}=2i-j-2k$.

Also, find the angle between $\overline{U}, \overline{V}$.

(b)If $\overline{U}=(3xy)i+(2x+z)j+(y\sin z)k$. Find $\nabla.\overline{U}$ and $\nabla x\overline{U}$

(c)Verify Green's theorem for the integral $\oint_C (3x+2y)\,dx+(4x+y)\,dy$,

where C is formed by the sides of the triangle of vertices (0, 0), (2, 0), (2, 2)

Good Luck   Dr. Mohamed H. Eid