Exam Code 1232

FEB. 2023 EXAMINATION
I B.E./B.TECH. (4YDC) EXAM
MA 10501: MATHEMATICS - II

Time : 3 Hrs.] **[Max. Marks : 70**

TOTAL NO. OF QUESTIONS IN THIS PAPER : 5

Note : Each question carry five subparts a, b , c, d and e. Attempt subparts a, b, c and any one from d or e in each question. All questions carry equal marks.

Q.		Question	MARKS	CO	BL	PI
Q.1	(a)	If A and B are two unitary matrices, show that AB is a unitary matrix.	02	CO1	BL-1	1.1.1
	(b)	Express the matrix $A=\begin{bmatrix}1+i & 2 & 5-5i\\ 2i & 2+i & 4+2i\\ -1+i & -4 & 7\end{bmatrix}$ as the sum of Hermitian matrix and skew- Hermitian matrix.	02	CO1	BL-2	1.1.1
	(c)	Examine the following vectors for linear dependence $X_1=(1,2,4), X_2=(2,-1,3), X_3=(0,1,2), X_4=(-3,7,2)$	03	CO1	BL-2	1.1.1
	(d)	Discuss the consistency of the following system of equations and if consistent solve the equations : $2x-3y+7z=5, 3x+y-3z=13, 2x+19y-47z=32$	07	CO1	BL-3	1.1.1
		OR				
	(e)	Verify Cayley-Hamilton theorem for the matrix $A=\begin{bmatrix}2 & -1 & 1\\ -1 & 2 & -1\\ 1 & -1 & 2\end{bmatrix}$. and hence find A^{-1}.	07	CO1	BL-3	1.1.1
Q.2	(a)	Find differential equation of which $y=e^x(A\cos x+B\sin x)$ is a solution.	02	CO2	BL-1	1.1.1
	(b)	Define exact differential equation with example.	02	CO2	BL-2	1.1.1
	(c)	Solve $(1+y^2)dx=(\tan^{-1}y-x)dy$	03	CO2	BL-2	1.1.1
	(d)	Solve $(2x\log x-xy)dy+2ydx=0$	07	CO2	BL-2	1.1.1
		OR				
	(e)	Solve $\frac{d^2y}{dx^2}-5\frac{dy}{dx}+6y=x\cos 2x$.	07	CO2	BL-2	1.1.1
Q.3	(a)	Solve $4x^2\frac{d^2y}{dx^2}+16x\frac{dy}{dx}+9y=0$	02	CO3	BL-1	1.1.1
	(b)	Write the step of method of variation of parameters.	02	CO3	BL-2	1.1.1
	(c)	Find the particular integral of differential equation $x^2\frac{d^2y}{dx^2}+4x\frac{dy}{dx}+2y=e^x$	03	CO3	BL-2	1.1.1

	(d)	Solve the following simultaneous differential equation $\frac{dx}{dt}+4x+3y=t,\ \frac{dy}{dt}+2x+5y=e^t$	**07**	**CO3**	**BL-2**	2.4.1
		OR				
	(e)	A constant electromotive force E volts is applied to a circuit containing a constant resistance R ohms in series and a constant inductance L henries. If the initial current is zero, show that the current builds upto half its theoretical maximum in (L log2) / R seconds.	**07**	**CO3**	**BL-3**	2.4.1
Q.4	**(a)**	Define Normal distribution and its properties.	**02**	**CO4**	**BL-1**	1.1.1
	(b)	Prove that the Poisson distribution is limiting case of Binomial distribution.	**02**	**CO4**	**BL-1**	1.1.1
	(c)	By the method of least squares, find the straight line that best fits the following data : x: 1, 2, 3, 4, 5 y: 14, 27, 40, 55, 68	**03**	**CO4**	**BL-2**	1.1.1
	(d)	Derive the mean and variance of Binomial Distribution.	**07**	**CO4**	**BL-2**	1.1.1
		OR				
	(e)	If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals (i) Exactly 3 (ii) more than 2 individuals (iii) None (iv) more than 1 individuals will suffer a bad reaction.	**07**	**CO4**	**BL-2**	1[illegible]
Q.5	**(a)**	State Demoivre's theorem and write its applications.	**02**	**CO5**	**BL1**	1.1.1
	(b)	Find the general value of $\log(-3)$.	**02**	**CO5**	**BL-1**	1.1.1
	(c)	Prove that $\tanh Z$ and $\sinh Z$ are periodic function and find their periods.	**03**	**CO5**	**BL-2**	1.1.1
	(d)	If $u=\log\tan\left(\frac{\pi}{4}+\frac{\theta}{2}\right)$, then prove that (i) $\tanh\frac{u}{2}=\tan\frac{\theta}{2}$ and (ii) $\cosh u=\sec\theta$.	**07**	**CO5**	**BL-2**	1.1.1
		OR				
	(e)	Sum the series $\sin\alpha\cos\beta-\frac{1}{2}\sin^2\alpha\cos 2\beta+\frac{1}{3}\sin^3\alpha\cos 3\beta-\ldots\ldots\ldots\infty$.	**07**	**CO5**	**BL-3**	1.1.1

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Code: 937

JUNE-JULY 2022 EXAMINATION

I B.E/B. TECH EXAM

MA 10501:-MATHEMATICS-II

Time: 3 Hrs.] [Max. Marks: 70

TOTAL NO. OF QUESTIONS IN THIS PAPER:5

Note: Attempt all questions. All questions carry equal marks. Each question carries five subparts a, b, c, d and e. Parts a, b and c are compulsory and attempt any one from d and e.

S. No.		Questions	Marks	CO	BL	PI
Q.1	(a)	Show that $A=\begin{bmatrix}-i & 3+2i & -2-i\\ -3+2i & 0 & 3-4i\\ 2-i & -3-4i & -2i\end{bmatrix}$ is skew Hermitian matrix.	(02)	CO1	1	1.1.1
	(b)	Find the characteristic roots of the matrix $\begin{bmatrix}6 & -2 & 2\\ -2 & 3 & -1\\ 2 & -1 & 3\end{bmatrix}$	(02)	CO1	1,2	1.1.1
	(c)	State and prove Cayley Hamilton theorem.	(03)	CO1	1,2	1.1.1
	(d)	Determine the values of λ *and* μ such that the system $2x-5y+2z=8, 2x+4y+6z=5, x+2y+\lambda z=\mu$ Have (i) No solution (ii) A Unique Solution (iii) Infinite number of solution.	(07)	CO1	3	1.1.1
		OR				
	(e)	Reduce the following matrix to normal form and find its rank $A=\begin{bmatrix}1 & 2 & 3 & 0\\ 2 & 4 & 3 & 2\\ 3 & 2 & 1 & 3\\ 6 & 8 & 7 & 5\end{bmatrix}$	(07)	CO1	4	1.1.1
Q.2	(a)	Form the differential equation by eliminating the arbitrary constant $y^2=m(a^2-x^2)$	(02)	CO2	1	1.1.1
	(b)	Solve $\frac{dy}{dx}=e^{3x-2y}+x^2e^{-2y}$	(02)	CO2	1,2	1.1.1
	(c)	Solve $[1+\log(xy)]dx+\left[1+\frac{x}{y}\right]dy=0$	(03)	CO2	2	1.1.1
	(d)	Solve $x\frac{dy}{dx}+y=y^2 logx$	(07)	CO2	1,3	1.1.1
		OR				
	(e)	Solve $\frac{d^2y}{dx^2}+y=e^{-x}+cosx+x^3+e^x sinx$	(07)	CO2	1,3	1.1.1

Q.3	(a)	Find the Complimentary function of the differential equation $$x^2\frac{d^2y}{dx^2}-x\frac{dy}{dx}-3y=0$$	(02)	CO3	1	1.1.1
	(b)	Write down the basic steps for solving the method of variation of parameter.	(02)	CO3	2	1.1.1
	(c)	Find the Particular integral of $(1+x)^2\frac{d^2y}{dx^2}+(1+x)\frac{dy}{dx}+y=Sin[2\{\log(1+x)\}]$	(03)	CO3	1,2	1.1.1
	(d)	Solve $\frac{dx}{dt}+5x+y=e^t,\frac{dy}{dt}-x+3y=e^{2t}$	(07)	CO3	3	1.1.1
		OR				
	(e)	A coil having a resistance of 15 ohms. And an inductance of 10 henries is connected to a 90 volts supply. Determine the value of the current after 2 seconds. ($e^{-3}=0.05$)	(07)	CO3	1,2	1.1.1
Q.4	(a)	The mean and variance of a binomial distribution $P(X,n,p)$ are 4 and ${}^4/_3$ respectively. Find $P(X=2)$.	(02)	CO4	1	1.1.1
	(b)	Derive the recurrence formula for Poisson distribution	(02)	CO4	1	1.1.1
	(c)	The life of army shoes is normally distributed with mean 8 months and standard deviation 2 months. If 5000 pairs are insured, how many pairs would be expected to need replacement after 12 months? ($Given\ that\ P(Z\geq 2)=0.0228\ and\ Z=\frac{X-\mu}{\sigma}$)	(03)	CO4	2	1.1.1
	(d)	Derive the formula of mean and variance for binomial distribution.	(07)	CO4	3	1.1.1
		OR				
	(e)	Fit a second degree parabola to the following data taking y as dependent variable x: 1, 2, 3, 4, 5, 6, 7, 8, 9 Y: 2, 6, 7, 8, 10, 11, 11, 10, 9	(07)	CO4	3	1.1.1
Q.5	(a)	Separate $sec(x+iy)$ into real and imaginary parts.	(02)	CO5	2	1.1.1
	(b)	Express $\frac{(6+i)(2-i)}{(4+3i)(1-2i)}$ in the form of $a+ib$.	(02)	CO5	2	1.1.1
	(c)	Prove that $sech^{-1}x=log\frac{1+\sqrt{1-x^2}}{x}$	(03)	CO5	3	1.1.1
	(d)	If $\alpha,\alpha^2,\alpha^3,\alpha^4$ are the roots of $x^5-1=0$ find them and show that $(1-\alpha)(1-\alpha^2)(1-\alpha^3)(1-\alpha^4)=5$.	(07)	CO5	3	1.1.1
		OR				
	(e)	Sum the series $Sin\alpha-\frac{Sin(\alpha+2\beta)}{2!}+\frac{Sin(\alpha+4\beta)}{4!}-\cdots\infty$	(07)	CO5	3	1.1.1

ONLINE FEB. 2022 EXAMINATION

B.E. /B.TECH EXAM

MA 10501:- MATHEMATICS-II

Time:90 Minutes] **[Max. Marks: 40**

PART B: Descriptive Questions

TOTAL NO. OF QUESTIONS IN THIS PAPER : 5

Note: Each question carry three subparts a, b and c. Attempt any two from a, b and c. All questions carry equal marks.

S. No.		Questions	Marks	C0	BL	PI
Q.1	(a)	Reduce the matrix A into its normal form where $A=\begin{bmatrix} 1 & 2 & 0 & -1 \\ 3 & 4 & 1 & 2 \\ -2 & 3 & 2 & 5 \end{bmatrix}$ and hence obtain its rank.	(04)	CO1	2	1.1.1
	(b)	Find the Eigen values and Eigen vectors of the matrix $A=\begin{bmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{bmatrix}$	(04)	CO1	2,3	1.1.1
	(c)	Investigate the values of λ and μ so that the equations $2x+3y+5z=9,\ 7x+3y-2z=8,\ 2x+3y+\lambda z=\mu$ have (i)no solution (ii)a unique solution (iii)an infinite number of solutions.	(04)	CO1	2	1.1.1
Q.2	(a)	Solve $\frac{dy}{dx}=\frac{y-x+1}{y+x+5}$	(04)	CO2	2	1.1.1
	(b)	Solve $(x^2+y^2)dx-2xydy=0$	(04)	CO2	2	1.1.1
	(c)	Solve $(D^2+2D+4)y=e^x\sin 2x$	(04)	CO2	2	1.1.1

<table>
<tr><td>Q.3</td><td>(a)</td><td>Solve $x^2\frac{d^2y}{dx^2}-2x\frac{dy}{dx}-4y=x^2+2\log x$</td><td>(04)</td><td>CO3</td><td>2</td><td>1.1.1</td></tr>
<tr><td></td><td>(b)</td><td>Solve $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}-y=x^2e^x$ by method of variation of parameters.</td><td>(04)</td><td>CO3</td><td>3</td><td>1.1.1</td></tr>
<tr><td></td><td>(c)</td><td>The equations of electromotive force in terms of current i for an electrical circuit having resistance R and a condenser of capacity C, in series is $E=Ri+\int\frac{i}{C}dt$. Find the current i at any time t , when $E=E_0\sin wt$.</td><td>(04)</td><td>CO3</td><td>3</td><td>1.1.1</td></tr>
<tr><td>Q.4</td><td>(a)</td><td>Fit an exponential curve $y=ab^x$ to the following data
<table>
<tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>y</td><td>1.0</td><td>1.2</td><td>1.8</td><td>2.5</td><td>3.6</td><td>4.7</td><td>6.6</td><td>9.1</td></tr>
</table></td><td>(04)</td><td>CO4</td><td>3</td><td>1.1.1</td></tr>
<tr><td></td><td>(b)</td><td>In 800 families with 4 children each, how many families would be expected to have (i)2 boys and 2 girls (ii) at least 1 boy (iii)no girl . Assuming equal probabilities for girls and boys.</td><td>(04)</td><td>CO4</td><td>2</td><td>1.1.1</td></tr>
<tr><td></td><td>(c)</td><td>If 2% of light bulbs are defective, find the probability that (i) at least one is defective and (ii)exactly 7 are defective . Also find $P(1<X<8)$ in a sample of 100.</td><td>(04)</td><td>CO4</td><td>2</td><td>1.1.1</td></tr>
<tr><td>Q.5</td><td>(a)</td><td>Express $Log(Logi)$ in the form $A+iB$.</td><td>(04)</td><td>CO5</td><td>2</td><td>1.1.1</td></tr>
<tr><td></td><td>(b)</td><td>Sum the series
$1+\frac{\cos\alpha}{\cos\alpha}+\frac{\cos 2\alpha}{2!\cos^2\alpha}+\frac{\cos 3\alpha}{3!\cos^3\alpha}+-----\infty$</td><td>(04)</td><td>CO5</td><td>2</td><td>1.1.1</td></tr>
<tr><td></td><td>(c)</td><td>If $u=\log_e[\tan\left(\frac{\pi}{4}+\frac{\theta}{2}\right)$ prove that $\tan h\frac{u}{2}=\tan\frac{\theta}{2}$</td><td>(04)</td><td>CO5</td><td>2</td><td>1.1.1</td></tr>
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