CBCS SCHEME

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BMATEC301/BEC301/BBM301

Third Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
AV Mathematics III for EC/ BM Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Statistical table and Mathematics formula handbook are allowed.
3. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Obtain the Fourier series of $f(x)=\frac{\pi-x}{2}$ in $0<x<2\pi$. Hence deduce that $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+.....=\frac{\pi}{4}$.	6	L2	CO1
	b.	Find the Fourier series of $f(x)=\lvert x\rvert$ in $(-\ell, \ell)$. Hence show that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+......=\frac{\pi^2}{8}$.	7	L3	CO1
	c.	Expand $f(x) = 2x - 1$ as a cosine half range Fourier series in $0<x<1$.	7	L2	CO1
		OR			
Q.2	a.	Find the Fourier series of $f(x)=\begin{cases}1+\frac{2x}{\pi} & \text{in } -\pi<x<0\\ 1-\frac{2x}{\pi} & \text{in } 0<x<\pi\end{cases}$. Hence deduce that $\frac{\pi^2}{8}=\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+.......$	6	L2	CO1
	b.	Obtain the sine half range series of, $f(x)=\begin{cases}\frac{1}{4}-x & \text{in } 0<x<\frac{1}{2}\\ x-\frac{3}{4} & \text{in } \frac{1}{2}<x<1\end{cases}$	7	L2	CO1
	c.	Determine the constant term and the first cosine and sine terms of the Fourier series expansion of y from the following data : (see table below)	7	L1	CO1

x° :	0	45	90	135	180	225	270	315
y:	2	$\frac{3}{2}$	1	$\frac{1}{2}$	0	$\frac{1}{2}$	1	$\frac{3}{2}$

		Module – 2	M	L	C
Q.3	a.	Find the Fourier transform of the function, $f(x)=\begin{cases}1 & \text{for } \lvert x\rvert\le a\\ 0 & \text{for } \lvert x\rvert>a\end{cases}$. Hence evaluate $\int_0^\infty \frac{\sin x}{x}dx$.	6	L2	CO2
	b.	Find the Fourier sine and cosine transforms of $f(x)=e^{-\alpha x}$, $\alpha>0$.	7	L2	CO2
	c.	Find the Fourier sine transform of $\frac{e^{-ax}}{x}$, $a>0$.	7	L3	CO2

		OR			
Q.4	**a.**	If $f(x)=\begin{cases}1-x^2, & \lvert x\rvert<1\\ 0, & \lvert x\rvert\geq 1\end{cases}$, find the Fourier transform of f(x) and hence find the value of, $\int_0^\infty \frac{x\cos x-\sin x}{x^3}dx$.	6	L2	CO2
	b.	Find the Fourier sine transform of $f(x)=e^{-\lvert x\rvert}$ and hence evaluate $\int_0^\infty \frac{x\sin mx}{1+x^2}dx,\ m>0$.	7	L3	CO2
	c.	Find the Discrete fast fourier of signal = $(0, 1, 49)^T$	7	L3	CO2
		Module – 3			
Q.5	**a.**	Find the z-transform of, (i) $\cosh n\theta$ (ii) $\sinh n\theta$	6	L1	CO3
	b.	If $V(z)=\frac{2z^2+3z+12}{(z-1)^4}$, evaluate u_0, u_1 and u_2	7	L2	CO3
	c.	Find the inverse z-transform of, $\frac{z}{(z-1)(z-2)}$.	7	L2	CO3
		OR			
Q.6	**a.**	Solve by using z-transforms, $y_{n+2}+2y_{n+1}+y_n=n$ with $y_0=0=y_1$	6	L3	CO3
	b.	Find $z_T^{-1}\left[\frac{5z}{(3z-1)(2-z)}\right]$.	7	L2	CO3
	c.	Solve by using z-transforms $u_{n+2}-5u_{n+1}+6u_n=2^n$ with $u_0=0=u_1$.	7	L3	CO3
		Module – 4			
Q.7	**a.**	Solve $\frac{d^3y}{dx^3}+6\frac{d^2y}{dx^2}+11\frac{dy}{dx}+6y=0$.	6	L1	CO4
	b.	Solve $(D^2+1)y=x^2+4x-6$.	7	L2	CO4
	c.	Using the method of variation of Parameters of $\frac{d^2y}{dx^2}-6\frac{dy}{dx}+9y=e^{3x}$	7	L3	CO4
		OR			
Q.8	**a.**	Solve $6\frac{d^2y}{dx^2}+17\frac{dy}{dx}+12y=e^{-x}$.	6	L2	CO4
	b.	Solve the Cauchy's differential equation, $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}+8y=65\cos(\log x)$.	7	L2	CO4
	c.	The charge q in a series circuit containing an Inductance L, Capacitance C, emf E satisfy the differential equation, $L\frac{d^2q}{dt^2}+\frac{q}{C}=E$. Express q in terms of t.	7	L3	CO4
		Module – 5			
Q.9	**a.**	Fit a second degree parabola $y=a+bx+cx^2$ into least square sense for the data and estimate y at x = 6.	6	L1	CO5

x:	1	2	3	4	5
y:	10	12	13	16	19

	b.	Find a correlation coefficient for the two variables x and y. x: 92, 89, 87, 86, 83, 77, 71, 63, 53, 50 y: 86, 83, 91, 77, 68, 85, 52, 82, 37, 57	7	L2	CO5
	c.	Ten students got the following percentage of marks in two subjects x and y. Compute the rank correlation coefficient. x: 78, 36, 98, 25, 75, 82, 90, 62, 65, 39 y: 84, 51, 91, 60, 68, 62, 86, 58, 53, 47	7	L2	CO5
		OR			
Q.10	a.	If θ is the angle between the lines of regression show that $\tan\theta = \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2}\left(\frac{1-r^2}{r}\right)$.	6	L2	CO5
	b.	Obtain the lines of regression and hence find the coefficient of correlation for the data, x: 1, 3, 4, 2, 5, 8, 9, 10, 13, 15 y: 8, 6, 10, 8, 12, 16, 16, 10, 32, 32	7	L2	CO5
	c.	If $8x - 10y + 66 = 0$ and $40x - 18y = 214$ are the two regression lines. Find $\bar{x}$, $\bar{y}$ and r. Find σ_y if $\sigma_x = 3$.	7	L2	CO5

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Current Session : 02:00:00

02:00:00 Session is in progress.

Feedback/Remarks

Date:07-01-2025 | Session:02:00:00

For Subject Code : BMATEC301/BEC301/BBM301

1. Please read the question 4(c)and 7(c)as follows from subject code:BMATEC301/BEC301/BBM301 Fast Fourier of signal=(0,1,4,9) Q.7(c) solve