EPCET LIBRARY BANGALORE-49

CBCS SCHEME

USN | | | | | | | | | | |

BMATEC301/BEC301/BBM301

Third Semester B.E./B.Tech. Degree Examination, June / July 2026
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. M : Marks , L: Bloom's level , C: Course outcomes.
3. Use of VTU mathematics handbook, statistical table handbook is permitted.

		Module – 1	M	L	C
Q.1	a.	Find the Fourier Series Expansion of the function $f(x) = \|x\|$ in $(-\pi, \pi)$.	06	L2	CO1
	b.	Find the half range Fourier Cosine Series for $f(x) = (x-1)^2$ in $0 \le x \le 1$	07	L2	CO1
	c.	The following data gives the variations of periodic current over a period. t(Sec) | 0 | T/6 | T/3 | T/2 | 2T/3 | 5T/6 | T A (Amp) | 1.98 | 1.30 | 1.05 | 1.03 | -0.88 | -0.25 | 1.98 Find numerically the direct current part of the variable current and the amplitude of the first harmonic.	07	L3	CO1
		OR			
Q.2	a.	Obtain the Fourier Series of $f(x) = \frac{\pi - x}{2}$ in $0 < x < 2\pi$. Hence dedue that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \ldots\ldots = \frac{\pi}{4}$	06	L2	CO1
	b.	Find the half range Fourier Sine Series for $f(x) = 2x - 1$ in $0 < x < 1$.	07	L2	CO1
	c.	Obtain the constant term and the coefficients of the first cosine and sine terms in the Fourier Expansion of y from the table. x | 0 | 1 | 2 | 3 | 4 | 5 y | 9 | 18 | 24 | 28 | 26 | 20	07	L3	CO1
		Module – 2			
Q.3	a.	Find the Fourier transform of the function $f(x) = \begin{cases} 1, & \text{for } \|x\| \le a \\ 0, & \text{for } \|x\| > a \end{cases}$ Hence evaluate $\int_0^\infty \frac{\sin x}{x} dx$	06	L2	CO2
	b.	Find the Fourier sine transform of $f(x) = e^{-\|x\|}$ and hence evaluate $\int_0^\infty \frac{x \sin mx}{1+x^2} dx \quad ; m > 0$	07	L2	CO2
	c.	Find the Discrete Fourier Transform of the signal $(3, 4, 5, 5)^T$.	07	L3	CO2

OR

Q.4	**a.**	Find the Fourier transform of $f(x)=\begin{cases} x^2, & \lvert x\rvert < a \\ 0\ , & \lvert x\rvert > a \end{cases}$ where 'a' is positive constant.	**06**	**L2**	**CO2**
	b.	Find the Fourier sine and cosine transform of $2e^{-3x} + 3e^{-2x}$.	**07**	**L2**	**CO2**
	c.	Solve the Integral equation of $\int_0^\infty f(\theta)\cos\alpha\theta\, d\theta = \begin{cases} 1-\alpha, & 0\le\alpha\le 1 \\ 0, & \alpha > 1 \end{cases}$ Hence evaluate $\int_0^\infty \frac{\sin^2 t}{t^2}dt$	**07**	**L2**	**CO2**
		Module – 3			
Q.5	**a.**	Obtain the z – transform of cosnθ and sinnθ.	**06**	**L2**	**CO3**
	b.	Compute the inverse z-transform of $\frac{3z^2+2z}{(5z-1)(5z+2)}$	**07**	**L2**	**CO3**
	c.	Solve by using z-transforms : $y_{n+2} - 4y_n = 0$; gives that $y_0 = 0$ and $y_1 = 2$	**07**	**L2**	**CO3**
		OR			
Q.6	**a.**	Find the z-transforms of $2n + \sin(n\pi/4) + 1$.	**06**	**L2**	**CO3**
	b.	Obtain the inverse z-transform of $\frac{2z^2+3z}{(z+2)(z-4)}$	**07**	**L2**	**CO3**
	c.	Given $z_T(u_n) = \frac{2z^2+3z+4}{(z-3)^3}$ show that $u_1 = 2$, $u_2 = 21$.	**07**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Solve $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + y = 0$	**06**	**L2**	**CO4**
	b.	Solve $(D^2 + 3D + 2)\, y = 12\, x^2$	**07**	**L2**	**CO4**
	c.	Solve $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + 8y = 65\cos(\log x)$	**07**	**L3**	**CO4**

OR

Q.8	**a.**	Solve $(D^2 - 4D + 3)\ y = e^{3x} + 2^x + 7$	**06**	**L2**	**CO4**
	b.	Solve : $(2x+1)\ y'' - 6(2x+1)\ y' + 16y = 8\ (2x+1)^2$	**07**	**L2**	**CO4**
	c.	An alternating EME Esinpt is applied to a circuit at t = 0. Given the equation for the charge q as $L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{c} = PE \sin pt$ Find q.	**07**	**L3**	**CO4**

Module – 5

Q.9	**a.**	Fit a straight line y = ax + b for the following data:	**06**	**L2**	**CO4**

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

	b.	Show that if θ is the angle between the lines of regression, then $\tan\theta = \frac{\sigma_x\sigma_y}{\sigma_x^2 + \sigma_y^2}\left(\frac{1-r^2}{r}\right)$	**07**	**L3**	**CO5**
	c.	Ten students got the following percentage of marks in two subjects x and y. Compute their rank correlation co-efficient.	**07**	**L3**	**CO5**

Marks in x	78	36	98	25	75	82	90	62	65	39
Marks in y	84	51	91	60	68	62	86	58	53	47

OR

Q.10	**a.**	Fit a parabola $y = a + bx + cx^2$ for the data	**06**	**L2**	**CO5**

x	0	1	2	3	4
y	1	1.8	1.3	2.5	2.3

	b.	The following table gives the heights of father (x) and Sons (y) Find the lines of regression and hence calculate the co-efficient of correlation.	**07**	**L3**	**CO5**

x	65	66	67	67	68	69	70	72
y	67	68	65	68	72	72	69	71

	c.	Compute the rank correlation coefficient for the following ranks of ten candidates in two subjects.	**07**	**L2**	**CO5**

Sub – 1	4	8	7	6	5	9	10	3	2	1
Sub – 2	6	7	8	1	5	10	9	2	3	4

* * * * *