	1 3	GBGS SCHEME			
US	an	Third Semester B.E./B.Tech. Degree Examination, June/June/June/June/June/June/June/June/			
14	1	Engineering Mathematics for EEE	ii y 2	2027	
and the second sec	ANG				
1	ime			arks:	100
		Note: 1. Answer any FIVE full questions, choosing ONE full question from each 2. M : Marks, L: Bloom's level, C: Course outcomes.	moai	uie.	
		Module – 1	M	L	С
Q.1	a.	Solve $(4D^4 - 4D^3 - 23D^2 + 12D + 36) = 0.$	6	L2	CO
	b.	Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 25y = \sin x + x.$	7	L2	CO
	c.	Solve $(2x + 1)^2 y'' - 6(2x + 1)y' + 16y = 8(2x + 1)^2$ .	7	L3	CO
		OR d <sup>2</sup> v	6	L2	CO
Q.2	a.	Solve $\frac{d^2y}{dx^2} - 4y = \cosh(2x - 1)$ .			
	b.	Solve $x^{3} \frac{d^{3}y}{dx^{3}} + 3x^{2} \frac{d^{2}y}{dx^{2}} + x \frac{dy}{dx} + 8y = 65 \cos(\log x).$	7	L2	CO
	c.	In an L-C-R circuit the charge q on a plate of a condenser is given by	7	L3	CO
		L $\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{c} = E$ sinpt the circuit is tuned to resonance so that			
		$P^2 = \frac{1}{LC}$ , if initially the current i and the charge q be zero show that, for			
		small values of R/L the current in the circuit at time t is given by (Et/2L) sin pt.	e.		
		Module – 2	I		
Q.3	a.	Fit a straight line of the form $y = ax + b$ to the following data : x 1 3 4 6 8 9 11 14 y 1 2 4 4 5 7 8 9	6	L1	CO
	b.	Find the coefficient of correlation and obtain the equation of the lines of	7.	L2	CC
	U.	regression for the data :	ĺ '		
		x     6     2     10     4     8       y     9     11     5     8     7			
	c.	Test students got the following percentage of marks in two subjects x and y	7	L2	CC
		compute their rank correlation coefficient.Marks in x78369825758290626539			
		Marks in y         84         51         91         60         68         62         86         58         53         47			. 🛥
	1	OR		1	

		BMATH	<b>30</b> 1	/BE	E301
Q.4	a.	Fit a parabola $y = ax^2 + bx + c$ in least square sense to the data : x 10 12 15 23 20 y 14 17 23 25 21	6	L1	CO2
	b.	In a partially destroyed lab record only the lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y = 107$ respectively.	7	L2	CO2
		Calculate $\overline{x}$ , $\overline{y}$ and coefficient correlation between x and y.			(18) 18)
	с.	Ten competitors in music contest are ranked by three judges A, B and C in the following order. A       1       6       5       10       3       2       4       9       7       8         B       3       5       8       4       7       10       2       1       6       9         C       6       4       9       8       1       2       3       10       5       7         Use rank correlation coefficient to decide which pair of judges have the nearest approach to common taste of music.       9       8       1       2       3       10       5       7	7	L2	CO2
		Module – 3	1		1
Q.5	a.	Find the Fourier series of the function $f(x) =  x $ in $-\pi \le x \le \pi$ hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$ .	6	L2	CO3
	b.	Find the cosine half range series for $f(x) = 2x - 1$ over the interval $0 \le x \le 1$ .	7	L2	CO3
	c.	Given the following table : $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	7	L2	CO3
		OR			
Q.6	a.	Find the Fourier series of $f(x) = x (2\pi - x)$ over the interval $0 \le x \le 2\pi$ .	6	L3	CO3
	b.	Find the Fourier series for $f(x) = 2x - x^2$ in $0 \le x \le 2$ .	7	L2	CO3
	c.	Obtain the Fourier series of y up to the first Harmonics for the given data: $\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	7	L2	CO3
0 -		Module – 4			0.0
Q.7	a.	Find the Fourier transform of $f(x) = \begin{bmatrix} 1 -  x  & \text{for }  x  \le 1 \\ 0 &  x  > 1 \end{bmatrix}$	6	L3	CO4
	b.	Obtain the Fourier cosine transform of the function $f(x) = \begin{cases} 4x & 0 < x < 1 \\ 4 - x & 1 < x < 4 \\ 0 & x > 4 \end{cases}$	7	L2	CO4
	c.	Find the z-transform of $2n + \sin\left(\frac{n\pi}{4}\right) + 1$	7	L3	CO4
		OR	_i		

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NotationNotati	Q.8	a. (	Obtain the Fourier sine transform of $e^{- x }$ and hence evaluate	6	L3	CO4
b.       Obtain the inverse z-transform of $\frac{ SZ  +  ZZ }{( SZ  - 1)( SZ  + 2)}$ c.         c.       Solve the difference equation $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ with $y_0 = y_1 = 0$ 7       L3         Module - 5         Q.9       a.       A random variable X has the following probability function for various values of x. $\overline{x}  0  1  2  3  4  5  6  7 \\ P(x)  0  K  2X  2X  3K  K^2  2X^2  7K^2 + K \\ (i) Find K  (ii) Evaluate P(x < 6), P(x \ge 6) and P(3 < x \le 6).       7       L3         b.       In 800 families with 5 children each how many families would be expected to have (i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys (iv) atmost 2 girls, by assuming probabilities for boys and girls to be equal.       7       L4         C         C         A communication channel receives independent pulses at the rate of 12 pulses per micro second the probabilities of : (i) one error per microsecond (ii) one error per microsecond (iii) atleast one error per microsecond (iii) one error per microsecond (iii) atleast one error per microsecond (iii) two errors (v) atmost two errors       6       L         OR         OR         OR         OR         OR         OR         OR         OR         OR$			$\int_{0}^{\infty} \frac{x \sin mx}{1+x^2} dx  m \ge 0.$			
Module – 5         Module – 5         Q.9       a. A random variable X has the following probability function for various values of x. $\frac{x}{2(x)}$ $0$ $1$ $2$ $3$ $4$ $5$ $6$ $7$ $P(x)$ $0$ $k$ $2k$ $2K$ $3K$ $k^2$ $2K^2$ $7K^2 + K$ (i)       Find K       (ii) Evaluate $P(x < 6)$ , $P(x \ge 6)$ and $P(3 < x \le 6)$ .       6       Li         b.       In 800 families with 5 children each how many families would be expected to have (i) 3 boys (ii) 5 girls       (iii) either 2 or 3 boys (iv) atmost 2 girls, by assuming probabilities for boys and girls to be equal.       7       L         c.       A communication channel receives independent pulses at the rate of 12 pulses per micro second the probabilities of :       7       L         (i)       no error during a microsecond       7       L         (ii)       no error per microsecond       6       L         (i)       Null hypothesis       6       L         (i)       Null hypothesis       6       L         (iii)       Contidence limits       6       L         (i)       Null hypothesis       7       Contidence limits       7		b. (	Obtain the inverse z-transform of $\frac{3z^2 + 2z}{(5z-1)(5z+2)}$ .	7	L2	CO4
Q.9       a.       A random variable X has the following probability function for various values of x.       6       L: $x$ 0       1       2       3       4       5       6       7 $P(x)$ 0       K       2K       3K       K <sup>2</sup> 2K <sup>2</sup> 7K <sup>2</sup> + K       (i)       (i) Find K       (ii) Evaluate $P(x < 6)$ , $P(x \ge 6)$ and $P(3 < x \le 6)$ .       7       L:         b.       In 800 families with 5 children each how many families would be expected to have (i) 3 boys (ii) 5 girls       (ii) either 2 or 3 boys (iv) atmost 2 girls, by assuming probabilities for boys and girls to be equal.       7       L:         c.       A communication channel receives independent pulses at the rate of 12 pulses per micro second the probabilities of :       7       L:         (i) no error during a microsecond       (iii) atleast one error per microsecond       7       L:         (ii) one error per microsecond       (iii) one error ror microsecond       7       L:         (i) Null hypothesis       (i) Null hypothesis       6       L:         (ii) Null hypothesis       (v) atternative hypothesis       7       I:       1         (i) Null hypothesis       (v) Significance level       7       L:       1         b.       Ten individuals are chosen at random from a population and their he	2			7	L3	CO4
values of x.x01234567P(x)0K2K2K3KK²2K²7K² + K(i) Find K(ii) Evaluate $P(x < 6)$ , $P(x \ge 6)$ and $P(3 < x \le 6)$ .7L.b.In 800 families with 5 children each how many families would be expected to have (i) 3 boys (ii) 5 girls7L.c.A communication channel receives independent pulses at the rate of 12 pulses per micro second the probabilities of :7L.c.A communication channel receives independent pulses at the rate of 12 pulses per micro second the probabilities of :7L.(i) no error during a microsecond(ii) one error per microsecond7L.(ii) atleast one error per microsecond(iii) atleast one error per microsecond7L.(i) Null hypothesis(i) Null hypothesis6L(ii) Type I and Type II error(ii) Onfidence limits7L.(iv) Alternative hypothesis(v) Significance level7Lb.Ten individuals are chosen at random from a population and their heights in inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71 test the hypothesis that the mean height of the universe is 66 inches [t_{0.05} = 2.262 for 9 d.f.]7c.In experiments on pea breeding the following frequencies of seeds were7L			Module – 5			
viscous (i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys (iv) atmost 2 girls, by assuming probabilities for boys and girls to be equal.       7         c.       A communication channel receives independent pulses at the rate of 12 pulses per micro second the probability of transmission error is 0.001 for each microsecond compute the probabilities of : <ul> <li>(i) no error during a microsecond</li> <li>(iii) atleast one error per microsecond</li> <li>(iv) two errors</li> <li>(v) atmost two errors</li> </ul> 7     L           Q.10         a.         Explain the following terms: <ul> <li>(i) Null hypothesis</li> <li>(ii) Type I and Type II error</li> <li>(iii) Onfidence limits</li> <li>(iv) Alternative hypothesis</li> <li>(v) Significance level</li> </ul> 6     L           b.         Ten individuals are chosen at random from a population and their heights in inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71 test the hypothesis that the mean height of the universe is 66 inches [to.05 = 2.262 for 9 d.f.]           c.         In experiments on pea breeding the following frequencies of seeds were <li>7</li>	2.9		values of x.         x       0       1       2       3       4       5       6       7         P(x)       0       K       2K       2K       3K       K <sup>2</sup> 2K <sup>2</sup> 7K <sup>2</sup> + K	6	L2	CO5
pulses per micro second the probability of transmission error is 0.001 for         each microsecond compute the probabilities of :         (i) no error during a microsecond         (ii) one error per microsecond         (iii) atleast one error per microsecond         (iv) two errors         (v) atmost two errors         OR         Q.10         a.       Explain the following terms:         (i) Null hypothesis         (ii) Type I and Type II error         (iii) Confidence limits         (v) Significance level         b.         Ten individuals are chosen at random from a population and their heights in inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71 test the hypothesis that the mean height of the universe is 66 inches [t <sub>0.05</sub> = 2.262 for 9 d.f.]         c.       In experiments on pea breeding the following frequencies of seeds were		1	to have (i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys (iv) atmost 2 girls,	7	L3	CO5
Q.10       a.       Explain the following terms:       6       L         (i)       Null hypothesis       6       L         (ii)       Type I and Type II error       6       L         (iii)       Confidence limits       6       L         (iv)       Alternative hypothesis       7       L         b.       Ten individuals are chosen at random from a population and their heights in inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71 test the hypothesis that the mean height of the universe is 66 inches [t_{0.05} = 2.262]       7       L         c.       In experiments on pea breeding the following frequencies of seeds were       7       L		]	pulses per micro second the probability of transmission error is 0.001 for each microsecond compute the probabilities of : (i) no error during a microsecond (ii) one error per microsecond (iii) atleast one error per microsecond (iv) two errors (v) atmost two errors	7	L3	.CO5
<ul> <li>(i) Null hypothesis         <ul> <li>(ii) Type I and Type II error</li> <li>(iii) Confidence limits</li> <li>(iv) Alternative hypothesis</li> <li>(v) Significance level</li> </ul> </li> <li>b. Ten individuals are chosen at random from a population and their heights in inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71 test the hypothesis that the mean height of the universe is 66 inches [t<sub>0.05</sub> = 2.262 for 9 d.f.]</li> <li>c. In experiments on pea breeding the following frequencies of seeds were 7 L</li> </ul>	0.10				<b>X</b> 4	005
<ul> <li>inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71 test the hypothesis that the mean height of the universe is 66 inches [t<sub>0.05</sub> = 2.262 for 9 d.f.]</li> <li>c. In experiments on pea breeding the following frequencies of seeds were 7 L</li> </ul>	2.10	a.	<ul> <li>(i) Null hypothesis</li> <li>(ii) Type I and Type II error</li> <li>(iii) Confidence limits</li> <li>(iv) Alternative hypothesis</li> </ul>	6	L1	CO5
		V	inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71 test the hypothesis that the mean height of the universe is 66 inches $[t_{0.05} = 2.262]$	7	L3	CO5
Round and YellowWrinkled and GreenRound and GreenWrinkled and GreenTotal31510110832556Theory predicts that the frequencies should be in proportions 9:3:3:1.Examine the correspondence between theory and experiment.			obtainedRound and YellowWrinkled and GreenWrinkled and GreenTotal Green31510110832556Theory predicts that the frequencies should be in proportions 9:3:3:1.	7	L3	COS
$[\chi^2_{0.05} = 7.815 \text{ for } 3 \text{ d.f.}]$						

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