17MAT31

Third Semester B.E. Degree Examination, June/July 2019
Engineering Mathematics - ill

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Obtain the fourier series of the function $f(x) = x - x^2$ in $-\pi$ x 7 and hence deduce $\frac{\pi}{12} = \frac{1}{1^2} - \frac{1}{2} + \frac{1}{3} - \frac{1}{4^2} + \ldots\ldots\ldots$ **(08 Marks)**

b. Obtain the Half Range Fourier cosine series for the 1(x) = sin x in [0, rt]. **(06 Marks)**

c. Obtain the constant term and the coefficients of first sine and cosine terms in the fourier expansion of y given

x:	0	1	2	3	4	5
y:	9	18	24	28	26	20

(06 Marks)

OR

2 a. Obtain the Fourier series of gx) $\frac{7t}{2}$ in [0, 27] and hence deduce that

it 1 1 1
4 3 5 7 **(08 Marks)**

b. Find the fourier half range cosine series of the function $f(x) = 2x - x^2$ in [0, 3]. **(06 Marks)**

c. Expre

x:	0	30	60	90	120	150	180	210	240	270	300	330
y :	1.8	1,1	0.30	0.16	1.5	1.3	2.16	1.25	1.3	1.52	1.76	2.0

(06 Marks)

Module-2

3 a. Find the fourier transform of 1(x) = 0 x a x I > a and hence deduce

$\int^{a} \frac{\sin x - x\cos x}{x'} dx = 4$ **(08 Marks)**

b. Find the fourier sine transform of and hence evaluate .1X sinax + x ix ; a > 0 **(06 Marks)**

C. Obtain the z-transform of cosnO and sin no. **(06 Marks)**

OR

4 a. Find the fourier transform of f(x) **(08 Marks)**

b. Find the fourier cosine transform of gx) where

f(x) = x ; 0 < x <1
– x ; 1 < x < 2
x > 2 **(06 Marks)**

Important Note :

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c. Solve Li_n o + 6u,i-h1+ 9u,, = with u_0 = ul- 0 using z-transform. **(06 Marks)**

Module-3

5 a. Fit a straight line y = ax + b for the following data by the method of least squares.

x	0	3	4	6	8	9	11	14
y	1	2	4	4	5	i11	8	9

(08 Marks)

b. Calculate the coefficient of correlation for the data:

x:	92	89	87	86	83	77	70	63	53	50
y :	86	83	91	77	68	85	54	82	37	57

(06 Marks)

c. Compute the real root of xlogi $_0$x - 1.2 - 0 by the method of false position. Carry out 3 iterations in (2, 3y **(06 Marks)**

OR

6 a. Fit a second degree parabola to the following data $y = a + bx + cx^2$.

x:	1	1.5	2	2.5	3	3.5	
y:	1.1	1.3	1.6	2	2.7	3 A	4.1

(08 Marks)

b. If 0 is the angle between two regression lines, show that

tan 0 = $\frac{1 - r^{-}}{r}$ cf,a, „ ; 4- Cr ; explain significance of r = 0 and r ±1. **(06 Marks)**

c. Using Newton Raphson method, find the real root of the equation 3x = cos **x + 1** near $x_0 = 0.5$. Carry out 3 iterations. **(06 Marks)**

Module-4

7 a. From the following table, estimate the number of students who obtained marks between 40 and 45.

Marks :	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
No. of students	31	42	51	35	31

(08 Marks)

b. Use Newton's dividend formula to find f(9) for the data:

x :	5	7	11	13	17
f(x) :	150	392	1452	2366	5202

(06 Marks)

c. Find the approximate value of z 2 Vcos 0 dO by Simpson's $\frac{1}{3}$ rd rule by dividing **0,** rr into 6 equal parts. **(06 Marks)**

OR

8 a. The area A of a circle of diameter d is given for the following values:

	80	85	90	95	100
a	5026	5674	6362	7088	7854

Calculate the area of circle of diameter 105 by Newton's backward formula. **(08 Marks)**

b. Using Lagrange's interpolation formula to find the polynomial which passes through the points (0, -12), (1, 0), (3, 6), (4, **12).** **(06 Marks)**

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C. Evaluate f $\log_e$ x dx taking 6 equal parts by applying Weddle's rule. **(06 Marks)**

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Module-5

9 a. If F = 3xyi — y ˉ j , evaluate f F.dr where 'C' is arc of parabola $y = 2x^2$ from (0, 0) to (1, 2) **(08 Marks)**

b. Evaluate by Stokes theorem

(sin zdx — cos x dy + sin y dz), where C is the boundary of the rectangle 0 < x < ;

0 y 1, z= 3 **(06 Marks)**

x=

C. Prove that the necessary condition thr the I = if(x,y,y')dx to be extremum is

af d —
ay dx ay **= 0** (06 Marks)

OR

10 a. Using Green's theorem evaluate f(3x ^{2} 8y')1x + (4.y — 6xy)dy , where C is the boundary of the region bounded by the lines x = 0, y = 0, x + y = 1. **(08 Marks)**

b. Find the external value of ;' [(y')^2 — +4ycosxidx . Given that y(0) = 0, y (, 2 = 0. 1) **(06 Marks)**

c. Prove that the shortest distance between two points in a plane is along a straight line joining them. **(06 Marks)**