F 3101 (Pages : 4) Reg. No.................................

Name.....................................

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Common to all branches except Computer Science and Engineering/Information Technology

ENGINEERING MATHEMATICS—IV (CMELPASUF)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Answer any **one** *question from each module.*
All questions carry equal marks.

Module I

1. (a) Evaluate $\int_C z^2 dz$ where C is given by :

   (i) The line $x = 2y$ from (0, 0) to (2, 1).

   (ii) The line segment along the real axis from (0, 0) to (2, 0) and then vertically to (2, 1).

   Can you expect path independency for the above integrals ? Give reason.

   (12 marks)

   (b) Find the Laurents series expansion of $f(z) = \dfrac{z}{(z^2-1)(z^2+3)}$ in $|z| > 4$. (8 marks)

Or

2. (a) Using contour integration, evaluate $\int_0^{2\pi} \dfrac{d\theta}{5+4\cos\theta}$. (10 marks)

   (b) Using contour integration, evaluate $\int_{-\infty}^{\infty} \dfrac{x^2}{(x^2+1)^2}\, dx$. (10 marks)

Module II

3. (a) Find by Newton-Raphson method, the positive root of the equation $x^3 + x^2 + x = 100$.

   (10 marks)

   (b) Find by method of false position, the root of the equation $xe^x = 1$. (10 marks)

Turn over

4. (a) Apply Gauss-Seidel method to solve the equations :

$$10x+y+z=12,\ 2x+10y+z=13,\ x+y+5z=7.$$ (12 marks)

(b) Find a root of the equation $x^3-2x=5$, using bisection method correct to 3 decimal places. (8 marks)

Module III

5. (a) Use Taylor's series method to find $y(4.1)$ and $y(4.4)$ correct to three decimal places, given that $\frac{dy}{dx}=\left(x^2+y\right)^{-1}, y(4)=5$. (8 marks)

(b) Use Runge-Kutta method to find $y(0.4)$ in steps of 0.2 given $\frac{dy}{dx}=1+y^2\ y(0)=0$ correct to five decimal places. (12 marks)

Or

6. (a) Use Euler's modified method to compute $y(1, 1)$, given that $\frac{dy}{dx}=x(1+y)\ y(1)=1$ taking h = 0.05. Correct to 3 decimal places. (10 marks)

(b) Using Milne's Predictor-Corrector method find $y(1.2)$ taking h = 0.1, given $\frac{dy}{dx}=y-x^2, y(1)=1$. (10 marks)

Module IV

7. (a) Prove Shifting rules and hence show that $Z\left(\frac{1}{n!}\right)=e^{\frac{1}{z}}$. (8 marks)

(b) Using Z-transform solve $y_{n+2}-5y_{n+1}+6y_n=5^n$ with $y(0) = 0, y(1) = 1$. (12 marks)

Or

8. (a) If $Z(u_n)=\frac{2z^2+3z+4}{(z-1)^3}$, find the values of u_1 and u_2. (10 marks)

(b) Compute the following :

(i) $Z\left[\frac{2z^2+3z}{(z+2)(z-4)}\right]$. (ii) $Z^{-1}\left[\frac{z}{(z+1)^2(z-1)}\right]$. (10 marks)

Module V

9. (a) Use graphical method to solve the following L.P.P. :

Minimize $Z = 20x + 10y$

subject to the constraints,

$x + 2y \leq 40,$

$3x + y \geq 30,$

$4x + 3y \geq 60$ with $x, y \geq 0$.

(8 marks)

(b) How will you identify alternate solution of an L.P.P. ? Using simplex algorithm, solve the following L.P.P. :

Maximize $Z = 3x + 2y + 5z$

subject to the constraints,

$x + 2y + z \leq 430,$

$3x + 2z \leq 460,$

$x + 4z \leq 420$ with $x, y, z \geq 0.$

(12 marks)

Or

10. (a) Use Big-M method to solve the following L.P.P. :

Minimize $Z = 2x_1 + 9x_2 + x_3$

subject to the constraints,

$x_1 + 4x_2 + 2x_3 \geq 5,$

$3x_1 + x_2 + 2x_3 \geq 4,$

with $x_1, x_2, x_3 \geq 0$.

(10 marks)

(b) The following table gives cost matrix of transporting one unit of product from the sources A, B and C to the destinations D, F, G and H. Determine the optimum allocation minimum cost using MODI method :

	D	F	G	H	Supply
A	19	30	50	10	7
B	70	30	40	60	9
C	40	8	70	20	18
Demand	5	8	7	14	34

(10 marks)