Hall Ticket Number:

Code No. : 22111

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. II Year II-Semester Main & Backlog Examinations, May-2017

Mathematics-IV
(CSE, ECE & Mech. Engg.)

Time: **3** hours   Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. Find $L(e^{2t}cos^2\, t)$
2. Find $L^{-1}\left(\frac{1}{s(s^2+a^2)}\right)$
3. Given $F\left(e^{-x^2}\right) = \sqrt{\pi}\, e^{-\frac{s^2}{4}}$, find the Fourier transform of $e^{-\frac{x^2}{3}}$
4. Find the Fourier transform of $f(x) = \begin{cases} 1 & for\ \ |x| < 1 \\ 0 & for\ |x| > 1 \end{cases}$
5. Find $Z(e^{-an}\, n)$
6. Find $Z^{-1}\left(\frac{5z}{(2-z)(3z-1)}\right)$
7. Show that $\bar{z}$ is not analytic at any point in the Z- plane.
8. Evaluate using Cauchy's integral formula $\oint_c \frac{z^3-2z+1}{(z-1)^2}\, dz$ where C: $|z| = 2$
9. Obtain the Taylor's series expansion of $\cos z$ about $z = \frac{\pi}{2}$
10. Classify the singular points of $f(z) = \frac{z^2-1}{(z-1)^3}$

Part-B (5 × 10 = 50 Marks)

11. a) Using Convolution theorem, find $L^{-1}\left(\frac{s}{(S^2+a^2)^2}\right)$ [5]

    b) Solve using Laplace transforms $\frac{d^2y}{d\,t^2} + 2\frac{dy}{dt} - 3y = \sin t$ given $y = \frac{dy}{dt} = 0$ at $t = 0$ [5]

12. a) Solve the integral equation $\int_0^\infty f(x) \cos \alpha\, x\, dx = e^{-\alpha}$ [5]

    b) Find the Fourier Cosine transform of e^{-ax} [5]

13. a) State and prove Convolution theorem on Z-transform. [5]

    b) Solve the difference equation $u_{n+2} + 3u_{n+1} - 4u_n = 0$ given $u_0 = 3$, $u_1 = -2$ using Z-transform. [5]

14. a) Find the analytic function $f(z) = u + iv$, if $2u + v = e^x(\cos y - \sin y)$ [6]

    b) Find the Laurent series expansion of $f(z) = \frac{1}{(z-1)(z+3)}$ for [4]
    i) $1 < |z| < 3$ ii) $|z| > 3$

Contd...2

15. a) State and prove Cauchy's theorem on Residues . [5]

b) Evaluate $\int_0^{2\pi} \frac{d\theta}{2+\sin\theta}$ using residue theorem [5]

16. a) Find $L\left(\frac{e^{-t}\sin t}{t}\right)$ [4]

b) State and prove Convolution theorem of Fourier transform. [6]

17. Answer any **two** of the following:

a) Determine u_0, $u_1$and u_2 of the sequence $\{u_n\}$ where $Z\{u_n\} = U(z) = \frac{(z-1)^2(z+2)}{(z+3)(z+5)^2}$ [5]

b) Find the imaginary part of the analytic function whose real part is $y + e^x \cos y$ [5]

c) Find the Bilinear transformation which maps the points $z = \infty, i, 0$ to $w = -1, -i, 1$ [5]

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