

FACULTY OF ENGINEERING
B.E. II/IV Year (ECE/Mech./Prod./CSE) II Semester (Main)
Examination, April/May 2008
(New)

MATHEMATICS – IV

Time : 3 Hours]

[Max. Marks : 75

Answer all questions of Part A.
Answer any five questions from Part B.

Part A – (Marks : 25)

Choose the correct answer from the following :

1. If $f(z)$ is analytic in a domain D and $|f(z)| = K$ (constant) in D then $f(z)$ is _____ in D .
 (a) Constant (b) 0 (c) None

2. The value of $\int_0^{1+i} (x - y + i x^2) dz$ along the line from $z = 0$ to $z = 1 + i$ is :
 (a) $\frac{1-i}{3}$ (b) $\frac{i-1}{3}$ (c) $\frac{-1-i}{3}$ (d) None

3. Using Cauchy's Integral formula the value of $\int_C \frac{zdz}{z^2+1}$ where $C : |z + i| = 1$ is
 (a) $-\pi i$ (b) $2\pi i$ (c) πi (d) None

4. Residue of $f(z) = \frac{z \sin z}{(z - \pi)^3}$ at $z = \pi$ is
 (a) 1 (b) 0 (c) -1 (d) None

5. Using Residue theorem the value of $\int_C \frac{z-2}{z^2-z} dz$ where C is the circle $|z| = 2$ is _____.
 (a) πi (b) $-\pi i$ (c) $2\pi i$ (d) None

6. If A and B are two independent events, $P(A/B^c)$ is _____.
 (a) $P(A)$ (b) $P(B^c)$ (c) $P(A) \cdot P(B^c)$ (d) $P(A^c/B)$

7. The test statistics for equality of population variances is ———.

$$(a) Z = \frac{s_1^2 - s_2^2}{\sqrt{\frac{\sqrt{x^2}}{x_1} + \frac{\sqrt{y^2}}{x_2}}}$$

$$(b) F = \frac{s_1^2}{s_2^2} (s_1^2 > s_2^2)$$

$$(c) F = \frac{s_1^2}{s_2^2} (s_1^2 < s_2^2)$$

$$(d) Z = \frac{\bar{x} - \mu}{\pi / \sigma x}$$

8. If A and B are two mutually exclusive events then $P(A \cap B) = P(A) \cdot P(B/A)$

(TRUE / FALSE)

9. If the number of observations ($n < 30$) then the test known as large sample test.

(TRUE / FALSE)

10. A random sample of 10 boys had the IQ's 70, 120, 110, 101, 88, 83, 95, 98, 107 and 100. Do these data support the assumption of a population mean IQ of 160.

Part B – (Marks : $5 \times 10 = 50$)

11. (a) Verify that the function $V(x, y) = e^{-x}(y \sin y + x \cos y)$ is harmonic and find the corresponding analytic function $f(z) = u(x, y) + iV(x, y)$.

(b) Find the bilinear transformation that maps $z = 1, i, -1$ onto $w = 2, i, -2$.

12. (a) Evaluate $\int_C \frac{dz}{z^2 + 9}$ where C is $|z - 3i| = 4$ using Cauchy's integral formula.

(b) Evaluate $\int_{-\infty}^{\infty} \frac{x \sin(mx) dx}{x^2 + a^2}$ $m > 0, a > 0$ using residue theorem.

13. (a) X is a normal variate with mean 30 and standard deviation is 5. Find the probabilities that (i) $26 \leq x \leq 40$, (ii) $x \geq 45$.

(b) Fit a Poisson distribution to the following data :

No. of mistakes per page :	0	1	2	3	4
No. of pages :	109	65	22	3	1

14. (a) Fit a second degree parabola by using least squares approximation for the following data :

x	:	1	2	3	4
y	:	1.7	1.8	2.3	3.2

- (b) Derive r lies between -1 to 1 .

15. (a) State and prove Baye's theorem.

- (b) The diameter of an electric cable say X is assumed to be continuous Random variable with probability density function is given by $f(x) = 6x(1 - x)$; $0 \leq x \leq 1$. Determine a number b such that $P(x < b) = P(x > b)$.

16. (a) Expand $f(z) = \frac{2z - 3}{z^2 - 3z + 2}$ in the region $1 < |z| < 2$.

- (b) Find the correlation coefficient and equations of regression lines for the following values of x, y .

x	:	1	2	3	4	5
y	:	2	5	3	8	7

17. (a) State and prove Cauchy's integral theorem.

- (b) If 2% of the items made by a factory are defective. Find the probability p that there are defective items in a sample of 100 items.