

NG 17 (GROUP A)

PART AA — ENGINEERING MATHEMATICS

(Common to all candidates)

(Answer ALL questions)

1. The system of linear equations $4x + 3y = 7$,
 $2x + y = 6$ has
1. a unique solution
 2. no solution
 3. an infinite number of solutions
 4. exactly two distinct solutions
4. Let $u(x, y) = \log\left(\frac{x^2}{y}\right)$. The value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is equal to
1. $2u$
 2. 1
 3. 0
 4. u
2. Let $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$. The eigenvalues of $2A^{-1}$ are
1. $-\frac{1}{3}$ and -2
 2. $\frac{1}{2}$ and $\frac{1}{3}$
 3. -1 and -6
 4. 3 and $\frac{1}{2}$
5. The particular integral of $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = e^x \cos x$ is
1. $\frac{x^2 e^x \sin x}{2}$
 2. $\frac{x e^x \sin x}{3}$
 3. $\frac{x e^x \sin x}{2}$
 4. $\frac{x^2 e^x \sin x}{3}$
3. The quadratic form $Q(x, y) = 3x^2 + 2xy + 4y^2$ is
1. positive semidefinite
 2. negative semidefinite
 3. negative definite
 4. positive definite
6. By eliminating the constants 'a' and 'b' from $x^2 + y^2 + (z - a)^2 = b^2$, the partial differential equation is
1. $x^2 \frac{\partial z}{\partial y} - y^2 \frac{\partial z}{\partial x} = 0$
 2. $x \frac{\partial z}{\partial x} - y \frac{\partial z}{\partial y} = 0$
 3. $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} = 0$
 4. $x \frac{\partial z}{\partial y} - y \frac{\partial z}{\partial x} = 0$

7. If ϕ and ψ are scalar functions, then the value of $\nabla \cdot (\nabla \phi \times \nabla \psi)$ is
1. 1
 2. 0
 3. -1
 4. 2
8. Let $\vec{F} = x\vec{i} + y\vec{j} + z\vec{k}$ and S be the surface of a unit sphere. By the Gauss divergent theorem, the value of $\iint_S \vec{F} \cdot \hat{n} dS$, where \hat{n} is a unit outward normal to S , is
1. 2π
 2. $\frac{4\pi}{3}$
 3. 4π
 4. $\frac{5\pi}{3}$
9. If $f(z) = u(x, y) + iv(x, y)$ is analytic in a domain D , then its component functions $u(x, y)$ and $v(x, y)$ are
1. harmonic in D
 2. not harmonic in D
 3. not satisfying the C-R equations in D
 4. not differentiably partially in D
10. The residue of $f(z) = \frac{ze^z}{(z-1)^3}$ is
1. 1
 2. $\frac{3e}{2}$
 3. $\frac{2e}{3}$
 4. $\frac{e}{2}$
11. The Laurent expansion of $f(z) = \frac{1}{z(z-1)}$ valid for $|z| > 1$ is
1. $\frac{1}{z} \left(1 + \frac{1}{z} + \frac{1}{z^2} + \dots \right)$
 2. $\frac{1}{z} \left(1 + \frac{1}{z} + \frac{1}{z^2} + \dots \right) - \frac{1}{z}$
 3. $z \left(1 + \frac{1}{z} + \frac{1}{z^2} + \dots \right) - \frac{1}{z}$
 4. $z \left(1 + \frac{1}{z} + \frac{1}{z^2} + \dots \right)$
12. Let $F(s) = \frac{1}{s(s^2+1)}$ be the Laplace transform of $f(t)$. By inverse Laplace transform, $f(t)$ is
1. $1 - \sin t$
 2. $1 - \cos t$
 3. $1 + \cos t$
 4. $1 + \sin t$
13. The Fourier cosine transform of $f(x) = e^{-x}$, $x > 0$ is
1. $\sqrt{\frac{2}{\pi}} \left(\frac{1}{1+s^2} \right)$
 2. $\sqrt{\frac{\pi}{2}} \left(\frac{1}{1+s^2} \right)$
 3. $\sqrt{\frac{2}{\pi}} \left(\frac{s}{1+s^2} \right)$
 4. $\sqrt{\frac{\pi}{2}} \left(\frac{s}{1+s^2} \right)$

14. The region of convergence of the Z-transform of a unit step sequence $U(n)=\begin{cases} 1, & n \geq 0 \\ 0, & n < 0 \end{cases}$ is
1. $|z|<1$
 2. $\operatorname{Re}(z)>0$
 3. $\operatorname{Re}(z)<0$
 4. $|z|>1$
15. As soon as a new value of a variable is found by iteration, it used immediately in the following equations, this method is called
1. Gauss-Jordan method
 2. Gauss-Seidal method
 3. Jacobi's method
 4. Relaxation method
16. Let $\frac{dy}{dx} = \frac{(y-2x)}{y}$, $y(0)=1$. By using Euler's method, the value of $y(0.1)$ is
1. 1.1919
 2. 1.9191
 3. 1.1818
 4. 1.8181
17. For what of α and β , the quadrature formula $\int_{-1}^1 f(x) dx = \alpha f(-1) + f(\beta)$ is exact for all polynomial of degree ≤ 1 .
1. $\alpha=1, \beta=1$
 2. $\alpha=-1, \beta=1$
 3. $\alpha=1, \beta=-1$
 4. $\alpha=-1, \beta=-1$
18. It is given that the events A and B are such that $P(A)=\frac{1}{4}$, $P(A/B)=\frac{1}{2}$ and $P(B/A)=\frac{2}{3}$, then $P(B)$ is
1. $\frac{1}{6}$
 2. $\frac{2}{3}$
 3. $\frac{1}{2}$
 4. $\frac{1}{3}$
19. The probability density function of random variable X is given by $f(x)=\begin{cases} cx e^{-x^2}, & x \geq 0 \\ 0, & x < 0. \end{cases}$ The value of c is
1. $\frac{1}{2}$
 2. -2
 3. 2
 4. $-\frac{1}{2}$
20. The joint probability density function of random variables X and Y is given by
- $$f(x,y)=\begin{cases} \frac{1}{y}, & 0 \leq x \leq y, 0 < y < 1 \\ 0, & \text{otherwise.} \end{cases}$$
- The marginal probability density function $f(x)$ is
1. $-\log x, 0 < x \leq 1$
 2. $\log x, 0 < x \leq 1$
 3. $e^x, 0 < x \leq 1$
 4. $e^{-x}, 0 < x \leq 1$

NG 17

ANSWER SHEET

Answer Sheet Number

402513

Name of the Examination Centre 

I certify that I have verified the entries, shading of Registration Number, Question Book Number and the Candidate's Signature.

Candidate's Signature

Hall Superintendent's Signature

Seal of the Examination Centre

Seal of the Examination Centre

Instructions to Candidate

1. Use Black Ball point Pen for shading inside the brackets as shown below.
2. Ensure your choice before shading.
3. Do not make any stray marks inside the answer brackets as the scanner will treat it as multiple shadings. Handle this sheet with care.
4. Any malpractice committed is punishable as per Anna University norms.

Registration Number

Question Book Number

Subject Number

| | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| [1] | [1] | [1] | [1] | [1] | [1] | [1] | [1] | [1] |
| [2] | [2] | [2] | [2] | [2] | [2] | [2] | [2] | [2] |
| [3] | [3] | [3] | [3] | [3] | [3] | [3] | [3] | [3] |
| [4] | [4] | [4] | [4] | [4] | [4] | [4] | [4] | [4] |
| [5] | [5] | [5] | [5] | [5] | [5] | [5] | [5] | [5] |
| [6] | [6] | [6] | [6] | [6] | [6] | [6] | [6] | [6] |
| [7] | [7] | [7] | [7] | [7] | [7] | [7] | [7] | [7] |
| [8] | [8] | [8] | [8] | [8] | [8] | [8] | [8] | [8] |
| [9] | [9] | [9] | [9] | [9] | [9] | [9] | [9] | [9] |
| [0] | [0] | [0] | [0] | [0] | [0] | [0] | [0] | [0] |

| | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| [1] | [1] | [1] | [1] | [1] | [1] | [1] | [1] | [1] |
| [2] | [2] | [2] | [2] | [2] | [2] | [2] | [2] | [2] |
| [3] | [3] | [3] | [3] | [3] | [3] | [3] | [3] | [3] |
| [4] | [4] | [4] | [4] | [4] | [4] | [4] | [4] | [4] |
| [5] | [5] | [5] | [5] | [5] | [5] | [5] | [5] | [5] |
| [6] | [6] | [6] | [6] | [6] | [6] | [6] | [6] | [6] |
| [7] | [7] | [7] | [7] | [7] | [7] | [7] | [7] | [7] |
| [8] | [8] | [8] | [8] | [8] | [8] | [8] | [8] | [8] |
| [9] | [9] | [9] | [9] | [9] | [9] | [9] | [9] | [9] |
| [0] | [0] | [0] | [0] | [0] | [0] | [0] | [0] | [0] |



| | |
|-----|-----|
| [1] | [1] |
| [2] | [2] |
| [3] | [3] |
| [4] | [4] |
| [5] | [5] |
| [6] | [6] |
| [7] | [7] |
| [8] | [8] |
| [9] | [9] |
| [0] | [0] |

| Q. No. | Answers |
|--------|-----------------|
| 1 | [1] [2] [3] [4] |
| 2 | [1] [2] [3] [4] |
| 3 | [1] [2] [3] [4] |
| 4 | [1] [2] [3] [4] |
| 5 | [1] [2] [3] [4] |
| 6 | [1] [2] [3] [4] |
| 7 | [1] [2] [3] [4] |
| 8 | [1] [2] [3] [4] |
| 9 | [1] [2] [3] [4] |
| 10 | [1] [2] [3] [4] |
| 11 | [1] [2] [3] [4] |
| 12 | [1] [2] [3] [4] |
| 13 | [1] [2] [3] [4] |
| 14 | [1] [2] [3] [4] |
| 15 | [1] [2] [3] [4] |
| 16 | [1] [2] [3] [4] |
| 17 | [1] [2] [3] [4] |
| 18 | [1] [2] [3] [4] |
| 19 | [1] [2] [3] [4] |
| 20 | [1] [2] [3] [4] |
| 21 | [1] [2] [3] [4] |
| 22 | [1] [2] [3] [4] |
| 23 | [1] [2] [3] [4] |
| 24 | [1] [2] [3] [4] |
| 25 | [1] [2] [3] [4] |
| 26 | [1] [2] [3] [4] |
| 27 | [1] [2] [3] [4] |
| 28 | [1] [2] [3] [4] |
| 29 | [1] [2] [3] [4] |
| 30 | [1] [2] [3] [4] |

| Q. No. | Answers |
|--------|-----------------|
| 31 | [1] [2] [3] [4] |
| 32 | [1] [2] [3] [4] |
| 33 | [1] [2] [3] [4] |
| 34 | [1] [2] [3] [4] |
| 35 | [1] [2] [3] [4] |
| 36 | [1] [2] [3] [4] |
| 37 | [1] [2] [3] [4] |
| 38 | [1] [2] [3] [4] |
| 39 | [1] [2] [3] [4] |
| 40 | [1] [2] [3] [4] |
| 41 | [1] [2] [3] [4] |
| 42 | [1] [2] [3] [4] |
| 43 | [1] [2] [3] [4] |
| 44 | [1] [2] [3] [4] |
| 45 | [1] [2] [3] [4] |
| 46 | [1] [2] [3] [4] |
| 47 | [1] [2] [3] [4] |
| 48 | [1] [2] [3] [4] |
| 49 | [1] [2] [3] [4] |
| 50 | [1] [2] [3] [4] |
| 51 | [1] [2] [3] [4] |
| 52 | [1] [2] [3] [4] |
| 53 | [1] [2] [3] [4] |
| 54 | [1] [2] [3] [4] |
| 55 | [1] [2] [3] [4] |
| 56 | [1] [2] [3] [4] |
| 57 | [1] [2] [3] [4] |
| 58 | [1] [2] [3] [4] |
| 59 | [1] [2] [3] [4] |
| 60 | [1] [2] [3] [4] |

| Q. No. | Answers |
|--------|-----------------|
| 61 | [1] [2] [3] [4] |
| 62 | [1] [2] [3] [4] |
| 63 | [1] [2] [3] [4] |
| 64 | [1] [2] [3] [4] |
| 65 | [1] [2] [3] [4] |
| 66 | [1] [2] [3] [4] |
| 67 | [1] [2] [3] [4] |
| 68 | [1] [2] [3] [4] |
| 69 | [1] [2] [3] [4] |
| 70 | [1] [2] [3] [4] |
| 71 | [1] [2] [3] [4] |
| 72 | [1] [2] [3] [4] |
| 73 | [1] [2] [3] [4] |
| 74 | [1] [2] [3] [4] |
| 75 | [1] [2] [3] [4] |
| 76 | [1] [2] [3] [4] |
| 77 | [1] [2] [3] [4] |
| 78 | [1] [2] [3] [4] |
| 79 | [1] [2] [3] [4] |
| 80 | [1] [2] [3] [4] |
| 81 | [1] [2] [3] [4] |
| 82 | [1] [2] [3] [4] |
| 83 | [1] [2] [3] [4] |
| 84 | [1] [2] [3] [4] |
| 85 | [1] [2] [3] [4] |
| 86 | [1] [2] [3] [4] |
| 87 | [1] [2] [3] [4] |
| 88 | [1] [2] [3] [4] |
| 89 | [1] [2] [3] [4] |
| 90 | [1] [2] [3] [4] |

| Q. No. | Answers |
|--------|-----------------|
| 91 | [1] [2] [3] [4] |
| 92 | [1] [2] [3] [4] |
| 93 | [1] [2] [3] [4] |
| 94 | [1] [2] [3] [4] |
| 95 | [1] [2] [3] [4] |
| 96 | [1] [2] [3] [4] |
| 97 | [1] [2] [3] [4] |
| 98 | [1] [2] [3] [4] |
| 99 | [1] [2] [3] [4] |
| 100 | [1] [2] [3] [4] |
| 101 | [1] [2] [3] [4] |
| 102 | [1] [2] [3] [4] |
| 103 | [1] [2] [3] [4] |
| 104 | [1] [2] [3] [4] |
| 105 | [1] [2] [3] [4] |
| 106 | [1] [2] [3] [4] |
| 107 | [1] [2] [3] [4] |
| 108 | [1] [2] [3] [4] |
| 109 | [1] [2] [3] [4] |
| 110 | [1] [2] [3] [4] |
| 111 | [1] [2] [3] [4] |
| 112 | [1] [2] [3] [4] |
| 113 | [1] [2] [3] [4] |
| 114 | [1] [2] [3] [4] |
| 115 | [1] [2] [3] [4] |