



C14-EE-102/C14-CHPP-102

4041

BOARD DIPLOMA EXAMINATION, (C-14)

MARCH/APRIL—2016

DEEE—FIRST YEAR EXAMINATION

ENGINEERING MATHEMATICS—I

Time : 3 hours]

[Total Marks : 80

PART—A

3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

1. Resolve $\frac{1}{(x-5)(x-7)}$ into partial fractions.

2. If $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 3 & 8 \\ 7 & 2 \end{pmatrix}$ and $2X = A + B$, then find X .

3. Using Laplace's expansion, evaluate $\begin{vmatrix} p & q & r \\ r & p & q \\ q & r & p \end{vmatrix}$

4. Show that $\frac{\cos 12^\circ \sin 12^\circ}{\cos 12^\circ \sin 12^\circ} = \tan 57^\circ$

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5. Prove that $\frac{\sin 2A}{1 - \cos 2A} = \tan A$.
6. Find the modulus of the complex number $\frac{3 - 4i}{5 + 7i}$.
7. Find the perpendicular distance of the point (3, 2) from the line $4x - 5y - 6 = 0$.
8. Find the centre and radius of the circle $x^2 + y^2 - 6x - 4y - 12 = 0$.
9. Evaluate $\lim_{a \rightarrow 0} \frac{\tan a}{\sin b}$.
10. If $y = e^{8x} \sec x$, then find $\frac{dy}{dx}$.

PART—B

10×5=50

Instructions : (1) Answer *any five* questions.

(2) Each question carries **ten** marks.

11. (a) Show that $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a - b)(b - c)(c - a)$.

(b) Find the inverse of the matrix $\begin{bmatrix} 1 & 0 & 2 \\ 3 & 4 & 5 \\ 2 & 3 & 1 \end{bmatrix}$.

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12. (a) Prove that $\frac{\sin 8A}{\cos 8A} - \frac{\sin 6A}{\cos 6A} = \tan 7A$.

(b) Prove that $\tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{7} = \tan^{-1} \frac{6}{17}$.

- * 13. (a) Solve $2 \cos^2 \theta - 3 \cos \theta + 1 = 0$.
- (b) In any triangle ABC , prove that $a \sin(B - C) = 0$.
14. (a) Find the equation of the parabola whose focus is at $(1, -1)$ and directrix is $x + y - 2 = 0$.
- (b) Find the equation of the hyperbola whose foci are $(-3, 0)$ and $(3, 0)$ and $e = 6$.
15. (a) Find $\frac{dy}{dx}$ if $x = a(\sin \theta)$, $y = a(1 - \cos \theta)$.
- (b) If $y = x^{x^{x^{\dots}}}$ then prove that $\frac{dy}{dx} = \frac{y^2}{x(1 - y \log x)}$.
16. (a) If $y = a \cos(\log x) + b \sin(\log x)$, prove that $x^2 y_2 - xy_1 - y = 0$.
- (b) If $u = \sin^{-1} \frac{x^2 - y^2}{x + y}$, then prove that $x \frac{u}{x} + y \frac{u}{y} = \tan u$.
17. (a) Find the equations of tangent and normal to the curve $y = x^2 - 2x + 1$ at $(1, 2)$.
- (b) A particle is moving along a straight line according to the law $s = 2t^3 - 3t^2 - 15t + 18$ (t is in secs). Find its velocity when its acceleration is zero.
18. (a) The sum of two numbers is 24. Find the numbers when the sum of their squares is a minimum.
- (b) The time T of a complete oscillation of a simple pendulum of length l is given by the equation $T = 2\sqrt{\frac{l}{g}}$, where g is a constant. Find the approximate percentage error in the calculated value of T corresponding to an error 2% in the value of l .
