



C16-EE-102/C16-CHPP-102

6035

BOARD DIPLOMA EXAMINATION, (C-16)

OCT/NOV—2017

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

$$A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \text{ and } B = \begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix}$$

then find AB .

3. If

$$A = \begin{pmatrix} 1 & 1 \\ 0 & 1 \\ 2 & 3 \end{pmatrix} \text{ and } B = \begin{pmatrix} 2 & 1 \\ 3 & 0 \\ 0 & 1 \end{pmatrix}$$

find X such that $2A - 3B + 5X = 0$

4. Find the value of $\sin 15^\circ$.

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5. Prove that $\frac{\sin 2}{1 - \cos 2} = \tan$
6. Find the modulus of complex number $\frac{1 + \sqrt{3}i}{1 - i}$.
7. Find the intercepts of the line $3y - 5x - 7 = 0$ made with coordinate axes.
8. Find the equation of the line passing through the points $(1, -2), (-2, 3)$.
9. Evaluate
- $$\lim_{x \rightarrow 0} \frac{3x^4 - 4x^3 + 3x^2 - 5x}{5x^3 - 7x^2 + 3x - 2}$$
10. Differentiate the function $x^4 - 4x^3 - 7x - 2$ w.r.t. x .

PART—B

10×5=50

- Instructions** : (1) Answer *any five* questions.
 (2) Each question carries **ten** marks.

11. (a) Prove that

$$\begin{vmatrix} a & b & c & a & b & c & a & b & c \\ & 2b & & b & c & a & & 2b & \\ & & 2c & & 2c & & c & a & b \end{vmatrix} = (a - b - c)^3$$

- (b) In a given electrical network, the equations connecting the currents i_1, i_2, i_3 are

$$i_1 - i_2 - i_3 = 9, 2i_1 - 5i_2 - 7i_3 = 52, 2i_1 - i_2 - i_3 = 0$$

Calculate i_1, i_2, i_3 using Cramer's rule.

12. (a) Prove that $\cos 20^\circ \cos 40^\circ \cos 80^\circ = 0$

- (b) Prove that

$$\tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{7} + \tan^{-1} \frac{1}{8} = \frac{\pi}{4}$$

13. (a) Solve $2 \sin^2 \theta - \sin \theta - 1 = 0$.

(b) In any triangle ABC , show that

$$bc \cos^2 \frac{A}{2} = s^2$$

14. (a) Find the centre and radius of the circle

$$5x^2 + 5y^2 - 2x - 3y = 0$$

(b) Find the equation of the parabola whose focus is $(-4, 3)$ and directrix is $x - y - 2 = 0$.

15. (a) Differentiate the function

$$\frac{6x}{e \cdot \log(\tan x)}$$

w.r.t. x .

(b) Differentiate the function $\log(\cos x)$ w.r.t. $\cos(\log x)$.

16. (a) Find

$$\frac{dy}{dx}, \text{ if } y = (\sin x)^x$$

(b) Find $\frac{dy}{dx}$, if $y = \sqrt{\sin x} \sqrt{\sin x} \sqrt{\sin x} \dots$

17. (a) Find the equations of tangent, normal, to the curve $y = 2x^2 - 4x + 5$ at $(3, 11)$.

(b) The motion of a particle projected vertically is governed by the equation $s = 96t - 16t^2$. Find its initial velocity, its velocity at the end of 2 seconds, its acceleration at the end of 1st second, the greatest height attained by it and the time taken to attain maximum height.

18. (a) Show that the semi-vertical angle of the cone of maximum volume and given slant height is $\tan^{-1} \sqrt{2}$.

(b) If an error of 0.02 cm. is made in measuring the diameter 20 cm. of a sphere, find the approximate error in the surface area of the sphere.
