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C14–C–102/C14–CM–**102**

4015

BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2016

DCE—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 $\frac{x \quad 1}{(x \quad 2)(x \quad 3)}$ into partial fractions.

2. If $A \begin{matrix} 2 & 3 & 1 \\ 0 & 5 & 6 \\ 2 & 4 & 2 \end{matrix}$ and $B \begin{matrix} 2 & 6 & 2 \\ 4 & 1 & 3 \\ 6 & 1 & 0 \end{matrix}$, find AB.

3. Using Laplace's expansion, evaluate $\begin{vmatrix} 2 & 3 & 5 \\ 4 & 1 & 4 \\ 1 & 4 & 1 \end{vmatrix}$.

4. Prove that $\frac{\cos 37 \quad \sin 37}{\cos 37 \quad \sin 37} \quad \tan 82$.

5. Prove that $\sin x . \sin(60 \quad x) . \sin(60 \quad x) \quad \frac{1}{4} \sin 3x$.

6. Find the modulus of the complex number $(1 \quad i4)(4 \quad i3)$.

7. Find the distance between the parallel lines $3x \quad 4y \quad 7 \quad 0$ and $3x \quad 4y \quad 5 \quad 0$.

8. Find the equation of the circle whose centre is (2, 3) and radius is 4.

9. Evaluate $\underset{n}{\text{Lt}} \quad \frac{n \quad 1}{n}^{2n}$.

10. Differentiate $x^2 \sin 2x$ with respect to x.

PART—B

10×5=50

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

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

11. *(a)* Prove that

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

(b) Solve the following equations by Crammer's method :

$$\begin{aligned} x \quad 2y \quad 3z \quad 6 \\ 2x \quad 4y \quad z \quad 7 \\ 3x \quad 2y \quad 3z \quad 8 \end{aligned}$$

12. *(a)* If $A \quad B \quad C \quad 90$, then show that

$$\tan A \tan B \quad \tan B \tan C \quad \tan C \tan A \quad 1$$

(b) Solve :

$$\cos^{1} \frac{1 \quad a^2}{1 \quad a^2} \quad \sec^{1} \frac{1 \quad b^2}{1 \quad b^2} \quad 2\tan^{1} x$$

13. *(a)* If $\frac{a}{\cos A}$ $\frac{b}{\cos B}$, show that ABC is isosceles.

(b) Solve :

cos $\sqrt{3}$ sin 1

14. *(a)* Find the equation of the parabola whose axis is parallel to the X-axis and which passes through the points (2, 0), (0, 4) and (1, 2).

(b) Find the co-ordinates of the centre, vertices, eccentricity, foci, length of the latus rectum of the hyperbola $\frac{x^2}{16}$ $\frac{y^2}{9}$ 1.

15. *(a)* Differentiate sec ^{1} $\frac{1}{1 \quad 2x^2}$ with respect to x.

(b) Find $\frac{dy}{dx}$, if x^2 y^2 $3xy$ 7.

16. *(a)* If y $a\cos(\log x)$ $b\sin(\log x)$, then prove that x^2y_2 xy_1 y 0.

(b) If u ax^2 $2hxy$ by^2 $2gx$ $2fy$ c, then find $\frac{u}{x}$, $\frac{u}{y}$, $\frac{^2u}{x^2}$, $\frac{^2u}{y^2}$ where a, b, c f, g, h are constants.

17. *(a)* Find the equations of tangent and normal to the curve y x^2 $2x$ 1 at the point, where it cuts the X-axis.

(b) The displacement of a particle is given at any time by the relation S $2t^3$ $15t^2$ 70. Find its *(i)* initial velocity, *(ii)* time when velocity is zero, and *(iii)* velocity when acceleration is zero.

18. *(a)* Find two positive numbers, whose sum is 36 and such that the sum of their squares is minimum.

(b) Find approximately the value of $\sqrt{82}$.

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