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C14–EE/CHPP–102

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BOARD DIPLOMA EXAMINATION, (C–14)

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

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

3. Find $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1 & a & 1 \\ 1 & 1 & 1 & b \end{vmatrix}$.

4. Prove that $\frac{\cos 19 \quad \sin 19}{\cos 19 \quad \sin 19} \quad \tan 26$

5. Prove that $\frac{1 \quad \cos \quad \sin}{1 \quad \cos \quad \sin} \quad \tan \frac{}{2}$.

6. Find the modulus of $(3 \quad 4i)(4 \quad 3i)$.

7. Find the centre and radius of the circle

$$3x^2 \quad 3y^2 \quad 12x \quad 6y \quad 11 \quad 0$$

8. Find $\lim_{n} \dfrac{1^2 \quad 2^2 \quad 3^2 \quad 4^2 \quad \cdots \quad n^2}{n^3}$.

9. Find the equation of the line passing through the point $(\ 3, \quad 4)$ and parallel to the line $3x \quad y \quad 31 \quad 0$.

10. Find $\dfrac{dy}{dx}$, if $x \quad a(\quad \sin \ )$ and $y \quad a(1 \quad \cos \ )$.

PART—B

10×5=50

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

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

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. *(a)* Solve the equations $2x \quad y \quad 3z \quad 9, x \quad y \quad z \quad 6$ and $x \quad y \quad z \quad 2$ by using Gauss-Jordan method.

(b) Show that $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} \quad (a \quad b)(b \quad c)(c \quad a)(a \quad b \quad c)$.

12. *(a)* If $A \quad B \quad C \quad$, prove that

$$\cos 2A \quad \cos 2B \quad \cos 2C \quad 1 \quad 4 \sin A \sin B \cos C$$

(b) If $\sin^{1} x \quad \sin^{1} y \quad \sin^{1} z \quad \frac{}{2}$, then prove that

$$x^2 \quad y^2 \quad z^2 \quad 2xyz \quad 1$$

13. *(a)* Solve the triangle ABC with $b = 1$, $c = \sqrt{3}$ and $A = 30^\circ$.

(b) In a triangle ABC, if $B = 3C$, then show that

$$\cos C = \sqrt{\frac{b + c}{4c}}$$

14. *(a)* Find the equation of the parabola whose vertex is (4, 5) and directrix is $2x + 3y + 6 = 0$.

(b) Find the lengths of the semi-axes, centre, vertices, foci, LLR and equations of directrices of ellipse $3x^2 + 4y^2 = 36$.

15. *(a)* If $y = \log(x + \sqrt{x^2 + 1})$, show that $(1 + x^2)y_2 + xy_1 = 0$.

(b) Prove that $\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}$, if $x^y = e^{x - y}$.

16. *(a)* If $y = b\sin^3 \theta$, $x = a\cos^3 \theta$, find $\frac{d^2y}{dx^2}$.

(b) If $u = \log \frac{x^4 + y^4}{x + y}$, prove that $X\frac{u}{x} + Y\frac{u}{y} = 3$.

17. *(a)* Find the angle between the curves $Y^2 = 4X$ and $X + Y = 1$ at any point of intersection.

(b) Each side of a square increases at the rate of 1·5 cm/sec. Find the rate at which the area of the square increases when the side is 12 cm. Also find the rate at which its perimeter increases.

18. *(a)* A right circular cylinder is inscribed in a sphere of radius R. Show that the volume is maximum when its height is $\frac{2R}{\sqrt{3}}$.

(b) If an error of 0·003 cm is made in measuring radius 20 cm of a sphere, find approximate percentage error in its volume.

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