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C14–A/AA/AEI/BM/CH/CHST/C/CM/EC/EE/CHPP/ CHPC/CHOT/PET/M/RAC/MET/MNG/ IT/TT/PCT–102

4002

BOARD DIPLOMA EXAMINATION, (C–14)
OCT/NOV—2017
FIRST YEAR (COMMON) 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.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Resolve

$$\frac{1}{x^2(x \quad 2)}$$

into partial fractions.

2. Evaluate :

$$\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1 \quad a & 1 \\ 1 & 1 & 1 \quad b \end{vmatrix}$$

3. If

$$A \quad \begin{matrix} 2 & 1 & 4 \\ x & 0 & 1 \\ 1 & 2 & 0 \end{matrix}$$

is a singular matrix, find the value of x.

4. Show that

$$\frac{\cos 12^{o} \quad \sin 12^{o}}{\cos 12^{o} \quad \sin 12^{o}} \quad \tan 57^{o}$$

5. Prove that

$$\frac{1}{\tan 3A \quad \tan A} \quad \frac{1}{\cot 3A \quad \cot A} \quad \cot 4A$$

6. If $z \quad \cos \quad i \sin$, show that

$$Z^{3} \quad \frac{1}{z^{3}} \quad 2\cos 3 \ , \ Z^{3} \quad \frac{1}{z^{2}} \quad 2i \sin 3$$

7. Find the point of intersection of the lines $3x \quad 4y \quad 6 \quad 0$ and $6x \quad 5y \quad 9 \quad 0$.

8. Find the equation of the circle, whose centre is the point (–7, –3) and radius is 10.

9. Evaluate :

$$\lim_{x \quad 0} \frac{\sin 3x \quad \sin x}{\sin 4x \quad \sin 2x}$$

10. If $u \quad e^{ax} \sin by$ then find

$$\frac{u}{x}, \frac{u}{y}$$

PART—B

10×5=50

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

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

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

11. *(a)* Using matrix inversion method, solve the equations

$$2x \quad 8y \quad 5z \quad 5\,;\; x \quad y \quad z \quad 2\,;\; x \quad 2y \quad z \quad 2$$

(b) Prove that

$$\begin{vmatrix} 1 & b & c & b^2 & c^2 \\ 1 & c & a & c^2 & a^2 \\ 1 & a & b & a^2 & b^2 \end{vmatrix} \quad (a \quad b)(b \quad c)(c \quad a)$$

12. *(a)* If

$$A \quad B \quad C \quad \overline{}\,\frac{}{2}$$

then prove that $\cos 2A \quad \cos 2B \quad \cos 2C \quad 1 \quad 4\sin A \sin B \sin C$.

(b) If

$$\cos^{\ 1} x \quad \cos^{\ 1} y \quad \cos^{\ 1} z$$

then prove that $x^2 \quad y^2 \quad z^2 \quad 2xyz \quad 1$.

13. *(a)* Solve :

$$8\sin \quad \sin 3$$

(b) In a ABC, show that

$$\frac{C^2 \sin(A \quad B)}{\sin A \quad \sin B} \quad 0$$

14. *(a)* Find the eccentricity, centre, vertices, foci, length of the latus-rectum and equation of directices of the ellipse $3x^2 \quad 4y^2 \quad 12x \quad 8y \quad 4 \quad 0$.

(b) Find the equation of the hyperbola in the form

$$\frac{x^2}{a^2} \quad \frac{y^2}{b^2} \quad 1$$

whose eccentricity is 2 and whose distance between the foci is 16.

15. (a) If

$$y \quad \log\sqrt{\frac{1 \quad \sin x}{1 \quad \sin x}}$$

find $\frac{dy}{dx}$.

(b) Find

$$\frac{dy}{dx}$$

if $y \quad (\cos x)^{(\cos x)^{(\cos x)^{\cdots}}}$.

16. (a) If $x \quad \cos \quad \sin \;,\; y \quad \cos \quad \sin \;,$ find $\frac{dy}{dx}$.

(b) If

$$y \quad \log(x \quad \sqrt{x^2 \quad 1})$$

show that

$$(1 \quad x^2)y_2 \quad xy_1 \quad 0$$

17. (a) Find the lengths of the tangent, normal, sub-tangent, and subnormal for the curve $y \quad x^3 \quad 3x \quad 2$ at (0, 2).

(b) Find the rate at which the area of an equilateral triangle is increasing when each side is 10 cm and length of each side is increasing at the rate of 2 cm/min.

18. (a) The sum of the sides of a rectangle is constant. If the area is to be maximum show that the rectangle is a square.

(b) If the length of a simple pendulum l is a decreased by 2%, find the approximate percentage error in calculated value of its period T, where $T \quad 2\sqrt{\frac{l}{g}}$, and g is a constant.

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