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C14–EC–102/C14–CHPC–102/C14–PET–102

4034

BOARD DIPLOMA EXAMINATION, (C–14)

MARCH/APRIL—2016

DECE—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.

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

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

2. If $A \begin{matrix} \cos & \sin \\ \sin & \cos \end{matrix}$, then show that $A \quad A^T \quad A^T \quad A \quad I$, where I is the unit matrix of order 2.

3. Using Laplace expansion, evaluate the determinant

$$\begin{vmatrix} 0 & q & r \\ q & 0 & p \\ r & p & 0 \end{vmatrix}$$

4. Show that $\frac{\cos 37 \quad \sin 37}{\cos 37 \quad \sin 37} \quad \cot 8$.

5. Show that $\tan \frac{}{4} \qquad \tan \frac{}{4} \qquad 2\tan 2$.

6. Find the real and imaginary parts of the complex number $\frac{4 \quad 2i}{1 \quad 2i}$.

7. Find the equation of the straight line making intercepts $\frac{15}{3}$ and $\frac{7}{5}$ with the x-axis and y-axis respectively.

8. Find the equation of the point circle with centre (2, 3).

9. Evaluate : $\lim_{n} \frac{1^2 \quad 2^2 \quad 3^2 \quad \cdots \quad n^2}{n^3}$.

10. Differentiate between $x^2 \quad e^x \sec x$ with respect to x.

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)* If $A \begin{matrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & 1 & 0 \end{matrix}$, compute $A^2 \quad 5A \quad 6I$, where I is the unit matrix of order 3.

(b) Solve the system of equation

$$\begin{matrix} x & y & z & 3 \\ x & 2y & 3z & 4 \\ x & 4y & 9z & 6 \end{matrix}$$

using Gauss-Jordan method.

12. *(a)* In ABC, prove that

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

(b) Show that $\sin^{1}\frac{3}{5} \quad \sin^{1}\frac{8}{17} \quad \cos^{1}\frac{36}{85}$.

13. *(a)* Solve : $2\cos^2 \quad 3\sin \quad .$

(b) In ABC, if $A \quad 60$, show that

$$\frac{b}{c \quad a} \quad \frac{c}{a \quad b} \quad 1$$

14. *(a)* Find the vertex, focus, directrix, axis and length of latus rectum of the parabola $7x^2 \quad 4y \quad 0$.

(b) Find the equation of the ellipse whose axes are coordinate axes and passing through the points (1, 3) and (2, 2).

15. *(a)* Find the derivative of $e^{8x} \sec x$ with respect to x.

(b) Find $\frac{dy}{dx}$, if $y \quad x^{\tan x}$.

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

(b) If $z \quad \log(x^2 \quad y^2)$, show that $\frac{^2u}{x \quad y} \quad \frac{^2u}{y \quad x}$.

17. *(a)* Find the angle between the curves $x^2 \quad y^2 \quad 1$ and $xy \quad \sqrt{2}$ at $(\sqrt{2}, 1)$.

(b) A man of 2 m tall is approaching a lamp post at the rate of 0·5 m/sec. If the lamp is situated at a height of 8 m, then find the rate at which the length of the shadow of the man is decreasing.

18. *(a)* Find the dimensions of a rectangle of maximum area having a perimeter of 36 ft.

(b) Time of oscillation of a simple pendulum of variable length l is given by $T \quad 2\sqrt{\frac{l}{g}}$. If the length is increased by 2%, find the approximate increase in its time of oscillation, where g is a constant.

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