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

4002

BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2018

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

2. Define singular matrix. Give an example.

3. Find the value of $\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$.

4. If $\tan A \quad \frac{1}{2}$ and $\tan B \quad \frac{1}{3}$, then show that $A \quad B \quad 45$.

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

6. Find real and imaginary parts of the complex number $\frac{3 \quad 2i}{7 \quad 4i}$.

7. Find the acute angle between the lines $2x \quad y \quad 3 \quad 0$ and $x \quad y \quad 2 \quad 0$.

8. Find centre and radius of the circle $2x^2 \quad 2y^2 \quad 6x \quad 2y \quad 3 \quad 0$.

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

10. Find derivative of $\dfrac{2 \quad 3\cos x}{2 \quad 3\cos x}$ with respect to x.

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)* Find the inverse of the matrix $\begin{matrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{matrix}$.

(b) Solve the equations $2x \quad y \quad z \quad 1$, $x \quad 2y \quad 3z \quad 1$ and $3x \quad 2y \quad 4z \quad 5$ by Crammer's method.

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

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

(b) Prove that

$$2\tan^{1}\frac{1}{3} \quad \tan^{1}\frac{1}{7} \quad \frac{}{4}.$$

13. *(a)* Solve the equation $\cos 8 \quad \cos 2 \quad \cos 5$.

(b) In any ABC show that $a^3 \sin(B \quad C) \quad 0$.

14. *(a)* Find the vertex, focus, directrix and length of latus rectum of parabola $x^2 \quad 16y$.

(b) Find the equation of the conic whose focus is at $(\ 1, 1)$ and directrix $x \quad 4y \quad 3 \quad 0$ with eccentricity ½.

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

(b) Find $\frac{dy}{dx}$, if $x \quad \frac{2t}{1 \quad t^2}$ and $y \quad \frac{1 \quad t^2}{1 \quad t^2}$.

16. *(a)* If $x^y \quad y^x$, then show that $\frac{dy}{dx} \quad \frac{y(x\log y \quad y)}{x(y\log x \quad x)}$.

(b) If $u \quad \log(x \quad y \quad z)$, then prove that

$$x\frac{u}{x} \quad y\frac{u}{y} \quad z\frac{u}{z} \quad 1$$

17. *(a)* Find the length of tangent, normal, subtangent and subnormal to the curve $y^2 \quad 4ax$ at $(at^2, 2at)$

(b) A circular metal plate expands by heating so that its radius increases at the rate of 0·01 cm/sec. At what rate is surface area increasing when the radius is 2 cm?

18. *(a)* Find the maximum and minimum values of $2x^3 \quad 9x^2 \quad 12x \quad 10$.

(b) If the radius of spherical balloon is increased by 0·1%, find the approximate percentage increase in its volume.

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