

* C14-A-102/C14-AA-102/C14-AEI-102/C14-BM-102/
C14-C-102/C14-CH-102/C14-CHOT-102/C14-CHPC-102/
C14-CHPP-102/C14-CHST-102/C14-CM-102/C14-EC-102/
C14-EE-102/C14-IT-102/C14-M-102/C14-MET-102/

C14-MNG-102/C14-PCT-102/C14-PET-102/C14-RAC-102/C14-TT-**102**

4002

BOARD DIPLOMA EXAMINATION, (C-14)

JUNE-2019

FIRST YEAR (COMMON) EXAMINATION

ENGINEERING MATHEMATICS-I

Time: 3 Hours

Max. Marks: 80

PART-A

10x3=30M

Instructions: 1) Answer **all** questions.
2) Each question carries **three** marks.
3) Answer should be brief and straight to the point and shall not exceed five simple sentence

1) Resolve $\frac{x-4}{(x-2)(x-3)}$ into partial fractions.

2) If $A = \begin{bmatrix} 1 & -1 \\ 0 & 1 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ 3 & 0 \\ 0 & 1 \end{bmatrix}$, then find x such that $2A-3B-5x=0$

* 3) If the matrix $\begin{bmatrix} 1 & 2 & -2 \\ 2 & 3 & b \\ a & 4 & 5 \end{bmatrix}$ is symmetric then find the value of a+b.

4) prove that $\sin^2 75^\circ - \cos^2 45^\circ = \frac{\sqrt{3}}{4}$.

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- * 5) Prove that $\cos 20^\circ \cdot \cos 40^\circ \cdot \cos 60^\circ \cdot \cos 80^\circ = \frac{1}{16}$
- 6) Find the modulus of the complex number $\frac{4+7i}{7-4i}$
- 7) Find the acute angle between the straight lines $2x+y+5=0$ and $3x-y-9=0$.
- 8) Find the centre and radius of the circle whose equation is $x^2+y^2-4x+2y-11=0$.
- 9) Evaluate $\lim_{\theta \rightarrow 0} \frac{\sin 9\theta}{\tan 7\theta}$.
- 10) Differentiate $3 \cdot \cos x + 2 \cdot \log x + 21 \cdot x^2 - 5$ with respect to x .

PART-B

5x10=50M

- Instructions:**
- 1) Answer any **five** questions
 - 2) Each question carries **ten** marks.
 - 3) The answer should be comprehensive and the criteria for valuation are the content but not the length of the answer

11) a) Show that
$$\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix} = 2(a+b+c)^3.$$

b) Solve the system of equations $x+y+z=9$, $2x+5y+7z=52$, $2x+y-z=0$ using Cramer's rule.

12) (a) If $A+B+C=180^\circ$, prove that $\cos 2A + \cos 2B + \cos 2C = -1 - 4 \cos A \cos B \cos C$

* (b) Show that $\tan^{-1} \frac{2}{3} + \cot^{-1} \frac{4}{3} = \cot^{-1} \frac{6}{17}$.

13) (a) Solve, $\sin 6\theta \cdot \cos 2\theta = \sin 5\theta \cdot \cos \theta$

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

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- * 14) a) Find the centre, vertices, eccentricity, foci, length of latus rectum, equations of directrices, and axes of the ellipse $9x^2+25y^2=225$.
- b) The porch of a palace is in the shape of a parabola, its greatest height is 8 m and its span is 12m. Find the height at a point 4m from one end.
- 15) (a) Find the derivative of $\sqrt{\cos\sqrt{x}}$ With respect to x.
- (b) Differentiate e^{4x^2} with respect to $\sqrt{1+4x^2}$.
- 16) (a) if $x^y=y^x$, show that $\frac{dy}{dx} = \frac{y(x \log y - y)}{x(y \log x - x)}$.
- (b) if $u = \sin^{-1}\left(\frac{X^2 + y^2}{X + y}\right)$, then show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$.
- 17) a) Show that the two curves $4x^2+9y^2=72$ and $x^2-y^2=5$ cut orthogonally
- b) The volume of a sphere is increasing at the rate of 400 cc/sec. Find the rate at which its radius and surface area are increasing at the instant when its radius is 40 cm
- 18) a) The sum of two numbers is 24. Find them if their product is to be a maximum.
- b) The radius of a circle is measured to be 2.01 cm instead of the actual value 2 cm. Find approximately the absolute error and percentage error committed in calculating its area.

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