



C09-A-102/C09-AA-102/C09-AEI-102/C09-C-102/C09-CM-102/
C09-CH-102/C09-CHST-102/C09-EC-102/C09-EE-102/C09-FW-102/C09-IT-
102/C09-M-102/C09-MET-102/C09-MNG-102/C09-PKG-102/C09-TT-**102**

3002

BOARD DIPLOMA EXAMINATION, (C-09)

MARCH / APRIL - 2019

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) Answer should be brief and straight to the point.

- 1 If $x + \frac{1}{x} = 7$, find the value of $(x^2 + \frac{1}{x^2})$
- 2 Find the value of $4P_3 + 4C_3$
- 3 Resolve $\frac{x}{(x-a)(x-b)}$ into partial fractions.
- 4 Express $1 + i$ in the modulus amplitude form.
- 5 Prove that $\frac{\cot A - \tan A}{\cot A + \tan A} = \cos 2A$

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- 6 Show that $\frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ} = \cot 34^\circ$
- 7 Find the equation of a straight line passing through (2, -5) and perpendicular to $7x + 2y - 1 = 0$
- 8 Find the Centre and Radius of the Circle $x^2 + y^2 - 6x + 4y + 12 = 0$.
- 9 Differentiate $e^x \tan x$ w.r.t. x .
- 10 Find $\lim_{\theta \rightarrow 0} \frac{\tan a\theta}{\sin b\theta}$

PART - B

10×5=50

- Instructions :**
- (1) Answer any **FIVE** questions.
 - (2) Each question carries **TEN** marks.
 - (3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11 (a) If $A = \begin{bmatrix} 1 & 3 & 1 \\ 2 & 5 & 4 \\ 1 & 6 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 & 2 \\ -2 & 1 & 5 \\ 0 & -2 & 4 \end{bmatrix}$, find X such that $2A+3B-2X = 0$.

(b) Find the Adjoint of $\begin{bmatrix} 1 & 2 & 1 \\ 3 & 2 & 2 \\ 1 & 1 & 2 \end{bmatrix}$

- 12 (a) Solve $2 \sin^2 \theta + \sin \theta - 1 = 0$
- (b) In any $\triangle ABC$, show that $\sum \frac{\cos A}{a} = \frac{a^2 + b^2 + c^2}{2abc}$
- 13 (a) Show that $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$, in any Triangle ABC.
- (b) Show that $\sin^{-1} \frac{3}{5} + \sin^{-1} \frac{5}{13} = \cos^{-1} \frac{33}{65}$

- 14** (a) Find the vertex, Focus, equation of directrix, equation of axis and length of latusrectum of the Parabola represented by the equation $(y - 4)^2 = 20(x - 1)$.
- (b) Find the equation of the ellipse passing through (1,4), (-6, 1) with axes as coordinate axes.
- 15** (a) Find the centre, length of the Transverse axis, equations of the axes and length of latus rectum of hyperbola $4x^2 - 9y = 36$.
- (b) Find the distance between the points (3,2,-5) and (7,-1,6).
- 16** (a) If $y = \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \dots \text{to } \infty}}}$, show that
- $$\frac{dy}{dx} = \frac{1}{x(2y - 1)}$$
- (b) If $\log y = \text{Tan}^{-1}x$, find. $\frac{dy}{dx}$
- 17** (a) Find the angle between the curves $y^2 = 4ax$ and $x^2 = 4ay$.
- (b) A ladder of 20m long is placed against a vertical wall. Foot of the ladder is slipping away from the wall at rate of 2 cm/sec. Find the rate of descending of its top if the foot of the ladder is 12m away from the wall. Also find the distance between foot of the ladder from the wall when it and top are moving with the same rate.
- 18** (a) Find the maximum and minimum values of $4x^3 - 18x^2 + 24x - 7$.
- (b) A circular metal plate expands by heat so that its radius is increasing at the rate of 0.02 cm/sec. At what rate its area is increasing when the radius is 20cm ?