



C16S-A/AA/CH/CHST/EI/MNG/MET/IT/
TT/PKG/C/CM/EC/EE/M-102

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BOARD DIPLOMA EXAMINATION, (C-16S)

MARCH / APRIL - 2019

I SEMESTER (COMMON) EXAMINATION

ENGINEERING MATHEMATICS - I

Time : 3 Hours]

[Total Marks : 80

PART - A

2×15=30

- Instructions :*
- (1) Answer any 15 questions.
 - (2) Each question carries 2 marks.
 - (3) Answer should be brief and straight to the point and shall not exceed five simple sentences.

- 1 Find the value of $\log_{25} 5$. \log_5^{25}
- 2 Resolve $\frac{1}{(x+1)(x+2)}$ into partial fractions.
- 3 Define proper and improper fraction.
- 4 If $A = \begin{bmatrix} 2 & 3 & 1 \\ 0 & -1 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 & -6 \\ 0 & -1 & 3 \end{bmatrix}$ find $2A - 3B$.
- 5 If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ find AA^T .
- 6 If $A = \begin{bmatrix} 2 & 4 \\ -1 & k \end{bmatrix}$ and $A^2 = 0$ find k .

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7 If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ find $\det A$.

8 Evaluate $\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$ using Laplace's expansion.

9 Prove that $\sin^2 45^\circ - \sin^2 15^\circ = \sqrt{3}/4$.

10 Write the formula of $\tan(A+B)$, $\tan(A-B)$.

11 Write the formula of $\sin 3A$, $\cos 3A$.

12 Prove that $\frac{\sin 2\theta}{1 - \cos 2\theta} = \cot \theta$. <http://www.sbtetonline.com>

13 Find the value of $4\cos^3 10^\circ - 3\cos 10^\circ$.

14 Write the formula of $\sin C + \sin D$ and $\sin C - \sin D$.

15 Write the formula of $\tan^{-1} x + \tan^{-1} y$ and $2\tan^{-1} x$.

16 State Cosine rule.

17 State projection rule.

18 Write any two fundamental formula of hyperbolic functions.

19 Find the modulus of $\sqrt{3} + i$.

20 If $Z = 2 + 3i$ find $Z - \bar{Z}$.

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PART - B

10×5=50

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

21 (a) Resolve $\frac{1}{x^2(x-2)}$ in to partial fraction.

(b) Find the inverse of matrix $A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 3 & 2 \\ 2 & 1 & 2 \end{bmatrix}$.

22 (a) If $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 1 & 3 \\ 4 & 1 & 8 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 1 & 0 \\ 2 & -3 & 1 \\ 1 & 1 & -1 \end{bmatrix}$ show that $(AB)^T = B^T A^T$.

(b) Solve the Equations $x + y + z = 6$, $x + 2y + 3z = 14$,
 $x + 4y + 9z = 36$ using Cramer's rule.

23 (a) Prove that $\frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ} = \tan 56^\circ$.

(b) If $A + B = 45^\circ$ show that $(1 + \tan A)(1 + \tan B) = 2$.

24 (a) Prove that $\tan\left(\frac{\pi}{4} + \theta\right) - \tan\left(\frac{\pi}{4} - \theta\right) = 2 \tan 2\theta$.

(b) Prove that $\sin 10^\circ \sin 50^\circ \sin 70^\circ = 1/8$.

25 (a) Prove that $\cos 20^\circ - \cos 40^\circ - \cos 80^\circ = 0$,

(b) If $\cos x + \cos y = 3/7$ and $\cos x - \cos y = 5/9$,

show that $27 \tan\left(\frac{x-y}{2}\right) + 35 \cot\left(\frac{x+y}{2}\right) = 0$.

26 (a) If $A + B + C = 180^\circ$ prove that
 $\sin 2A - \sin 2B + \sin 2C = 4 \cos A \sin B \cos C$.

(b) Prove that $\sin^{-1}(3/5) + \sin^{-1}(5/13) = \cos^{-1}(33/65)$.

27 (a) If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \pi/2$ show that
 $x^2 + y^2 + z^2 + 2xyz = 1$.

(b) Solve $\tan^{-1}(1+x) + \tan^{-1}(1-x) = \tan^{-1}(1/2)$.

28 (a) Find the additive and multiplicative inverse of $\frac{2i}{1-2i}$.

(b) Express $\sqrt{3-i}$ in modulus-amplitude form.