

1347**Code : 15SC01M**Register
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I Semester Diploma Examination, Nov./Dec. 2016**ENGINEERING MATHEMATICS - I****Time : 3 Hours |****[Max. Marks : 100]**

- Note :**
- (i) Answer any **Ten** questions from Section-A, any **Eight** questions from Section-B and any **Five** questions from Section-C.
 - (ii) Each question carries **3** marks in Section-A.
 - (iii) Each question carries **5** marks in Section-B.
 - (iv) Each question carries **6** marks in Section-C.

BETA CONSOLE!**SECTION – A**

1. If $A = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$, $B = \begin{pmatrix} 3 & 2 \\ -1 & 4 \end{pmatrix}$, find $3A + 2B$.



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2. If $A = \begin{pmatrix} 2 & 0 \\ 1 & 4 \end{pmatrix}$, $B = \begin{pmatrix} -1 & 5 \\ 2 & 3 \end{pmatrix}$, find AB .



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3. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 2 & 3 \\ 0 & -1 \end{pmatrix}$, find adjoint of AB .

3

4. Find the unit vector of $\vec{a} = 2\mathbf{i} + 3\mathbf{j} - \mathbf{k}$.

3

5. If $\vec{a} = \mathbf{i} + 2\mathbf{j} - 3\mathbf{k}$, $\vec{b} = 3\mathbf{i} - 5\mathbf{j} + 2\mathbf{k}$, find $\vec{a} \cdot \vec{b}$.

3

6. Three coins are tossed simultaneously. List the sample space for event.

3

7. Prove that $\sin \theta \cdot \cos(90^\circ - \theta) + \cos \theta \cdot \sin(90^\circ - \theta) = 1$.

3

8. Show that $\tan(45^\circ + \theta) = \frac{1 + \tan\theta}{1 - \tan\theta}$. 3

9. Prove that $\cos 2A = 2\cos^2 A - 1$. 3

10. Prove that $\frac{\sin 68^\circ + \sin 52^\circ}{\cos 68^\circ + \cos 52^\circ} = \sqrt{3}$. 3

11. If $\sin A = \frac{1}{2}$, find the numerical value of $\sin(2A)$. 3

12. Find the conjugate of $\frac{1}{\cos \theta + i \sin \theta}$ 3

BETA CONSOLE!

13. Find the value of $\lim_{n \rightarrow (-2)} \left[\frac{x^3 + 8}{x + 2} \right]$ Diploma - [All Branches]
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14. Evaluate $\lim_{\theta \rightarrow 0} \left[\frac{\theta}{\tan 5\theta} \right]$ Diploma Question Papers [2015-19]
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SECTION – B

15. Solve for x if $\begin{vmatrix} 1 & 2 & 3 \\ 2 & x & 3 \\ 3 & 4 & 3 \end{vmatrix} = 0$. 5

16. Find the characteristic equation and roots of a square matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$. 5

17. Find the Cosine of the angle between the vectors $i + j - 3k$ and $2i + j - k$. 5

18. If $A = (3, -4, 2)$, $B = (-6, 8, 4)$, find the position vectors of A and B also find \vec{AB} vector and $|\vec{AB}|$. 5

19. Find the area of the parallelogram whose adjacent sides are $\vec{a} = 3\mathbf{i} + 2\mathbf{j} - \mathbf{k}$ and $\vec{b} = \mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$. 5

20. If $x = \log_7^9$, $y = \log_5^7$, $z = \log_3^5$, show that $xyz = 2$. 5

21. Evaluate $\cos 570^\circ$, $\sin 150^\circ$, $\sin 330^\circ$, $\cos 390^\circ$. 5

22. If $\tan A = \frac{1}{2}$, $\tan(A + B) = \frac{7}{9}$, find $\tan B$. 5

BETA CONSOLE!

23. Show that $\frac{1 - \cos 2\theta + \sin 2\theta}{1 + \cos 2\theta + \sin 2\theta} = \tan \theta$



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24. Prove that $\cos 40^\circ + \cos 80^\circ + \cos 160^\circ = 0$. 5



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25. Evaluate $\lim_{x \rightarrow 0} \left(\frac{\sqrt{1+x} - \sqrt{1-x}}{x} \right)$. 5

SECTION-C

26. Solve for x, y & z from the equations $4x + y = 7$, $3y + 4z = 5$, $5x + 3z = 2$ by Cramer's rule. 6

27. Find the inverse of $A = \begin{pmatrix} 3 & 1 & 2 \\ -2 & 1 & 1 \\ 3 & 0 & 2 \end{pmatrix}$. 6

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28. A force $\vec{F} = 2\mathbf{i} + \mathbf{j} + \mathbf{k}$ is acting at the point $(-3, 2, 1)$. Find the magnitude of the moment of force \vec{F} about the point $(2, 1, 2)$. 6

29. A box contains cards numbered from 1 to 20. A card is drawn at random. Find the probability that the card drawn bears
- a prime number
 - an even number
 - a number divisible by 4.
- 6

30. If $\tan \theta = \frac{4}{5}$ and $180^\circ < \theta < 270^\circ$, find the value of $\frac{5 \sin \theta + 7 \cos \theta}{6 \cos \theta - 3 \sin \theta}$ 6

BETA CONSOLE!

31. In a triangle ABC, Prove that $\sin A + \sin B + \sin C = 4 \cos\left(\frac{A}{2}\right) \cos\left(\frac{B}{2}\right) \cos\left(\frac{C}{2}\right)$. Diploma - [All Branches] 6



32. Evaluate $\left[i^{19} + \left(\frac{1}{i}\right)^{25}\right]^2$. 6

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33. Evaluate $\lim_{n \rightarrow \infty} \left[\frac{(5 - n^2)(n - 2)}{(2n - 3)(n + 3)(5 - n)} \right]$ 6

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