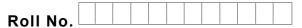
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Total No. of Pages : 02

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B.Tech. (BT) (2012 to 2017) (Sem.-3) MATHEMATICS Subject Code : BTBT-301 M.Code : 55071

Time: 3 Hrs.

Max. Marks:60

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

- 1. Find the centre and the radius of the circle $2x^2 + 2y^2 x = 0$.
- 2. Find rank of $\begin{bmatrix} 3 & -1 & 2 \\ -6 & 2 & 4 \\ -3 & 1 & -2 \end{bmatrix}$.
- 3. Which term of the A.P. $5, 2, -1, \dots, is-22?$
- 4. Find the equation of the normal to the parabola $y^2 = 12x$ which is perpendicular to the line x 3y + 6 = 0.
- 5. Find the number of permutations of the letters of word ALLAHABAD.
- 6. Find the inverse of the matrix $\begin{bmatrix} 2 & 0 & -1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$.
- 7. In what ratio, the line joining (-1, 1) and (5, 7) is divided by x + y = 4?
- 8. Prove that $\sin 105^\circ + \cos 105^\circ = \cos 45^\circ$.

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- 9. Prove that $\cos 4x = 1 8 \sin^2 x \cos^2 x$.
- 10. For what values of k does the equation $2x^2 + 3xy + y^2 3x + ky 2 = 0$ represents a pair of straight lines?

SECTION-B

- 11. For what value of λ , does the system $\begin{bmatrix} 1 & -2 & 1 \\ 3 & -1 & 2 \\ 0 & 1 & \lambda \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = O$ has
 - a) A unique solution.
 - b) Infinitely many solutions.
- 12. Three urns A, B, and C contain 6 red and 4 white, 2 red and 6 white, 1 red and 5 white balls respectively. An urn is chosen at random and a ball is drawn. If the ball drawn is found to be red, find the probability that the ball was drawn from urn A.
- 13. The sum of three numbers in G.P. is 28 and their product is 512. Find them.
- 14. In how many ways can 5 books on Chemistry and 4 books on Physics be arranged on a shelf so that the books on same subject remain together ?
- 15. If the 21^{st} and 22^{nd} terms of the expansion $(1 + x)^{44}$ are equal, then find the value of x.

SECTION-C

- 16. State and prove Cayley-Hamilton Theorem.
- 17. Find the equation of the circle passing through the points (1, 2), (3, -4), (5, -6).
- 18. Five defective bulbs are accidentally mixed with twenty good ones. It is not possible to just look at a bulb and tell whether or not it is defective. Find the probability distribution of the number of defective bulbs, if four bulbs are drawn at random from this lot.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.

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