

## CO-Wise AKTU Question Bank

Course: B.Tech

Subject Name: Elementary Mathematics -1

Subject Code: BBT101

Semester: I

| CO No. | Lect. No. | Syllabus Topic (As Per LP)                                                                          | Ques. No. | Question Statement (As Per AKTU)                                                                               | Session                                              |
|--------|-----------|-----------------------------------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| 1      | 6         | Algebraic solution of linear inequalities in one variable                                           | 1         | Solve $5x - 3 < 3x - 1$ , when x is a real number.(Very short)                                                 | 2021-22                                              |
| 1      | 1         | Fundamental Theorem of Algebra                                                                      | 2         | State Fundamental theorem of Algebra.(Very Short)                                                              | 2011-12<br>2013-14<br>2018-19<br>2021-22,<br>2022-23 |
| 1      | 6,7       | Algebraic solution of linear inequalities in one variable, and their representation on number line. | 3         | Solve $\frac{3x-4}{2} \geq \frac{x+1}{4} - 1$ . Also represent the solution set on number line. (Short)        | 2021-22                                              |
| 1      | 3         | Solution of Quadratic equation by Discriminant formula                                              | 4         | Solve the equation $x^2 + 2x + 2 = 0$ . (Long)                                                                 | 2021-22                                              |
| 1      | 8         | Graphical solution of linear inequalities in two variables                                          | 5         | Exhibit graphically the solution set of linear inequalities $3x + 4y \geq 12, x \geq 0, y \geq 1$ . (Long)     | 2021-22                                              |
| 1      | 2         | Solution of Quadratic equation by Factorization formula                                             | 6         | Solve the quadratic equation: $x^2 - 11x + 30 = 0$ . (very short)                                              | 2022-23                                              |
| 1      | 6         | Algebraic solution of linear inequalities in one variable                                           | 7         | Solve the inequality: $\frac{1}{2}\left(\frac{3}{5}x + 4\right) \geq \frac{1}{3}(x - 6)$ . (short)             | 2022-23                                              |
| 1      | 8         | Graphical solution of linear inequalities in two variables                                          | 8         | Find the area of the region represented by linear inequalities: $ x - y  \leq 3$ and $ x + y  \leq 3$ . (long) | 2022-23                                              |
| 1      | 8         | Graphical solution of linear inequalities in two variables                                          | 9         | Solve the system of linear inequalities $y \geq -x - 1, y \leq 2x + 1$ , by graphical method.                  | 2022-23                                              |
| 1      | 3         | Solution of Quadratic equation by Discriminant formula                                              | 10        | Solve the equation: $x^2 + 3x + 5 = 0$                                                                         | 2011-12<br>(Long)                                    |

|   |   |                                                                                                    |    |                                                                                                                              |                               |
|---|---|----------------------------------------------------------------------------------------------------|----|------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1 | 3 | Solution of Quadratic equation by Factorization formula                                            | 11 | For what value of $k$ , $(4-k)x^2 + (2k+4)x + (8k+1) = 0$                                                                    | 2018-19<br>(Long)             |
| 1 | 3 | Solution of Quadratic equation by Factorization formula                                            | 12 | Solve: $x^2 - 1 = 0$                                                                                                         | 2019-20<br>(Short)            |
| 1 | 3 | Solution of Quadratic equation by Factorization formula                                            | 13 | Solve: $(x+1)(x-2) + x = 0$                                                                                                  | 2020-21<br>(Long)             |
| 1 | 6 | Algebraic solution of linear inequalities in one variable                                          | 14 | Define linear inequality in one variable.                                                                                    | 2019-20<br>2020-21<br>(Short) |
| 1 | 6 | Algebraic solution of linear inequalities in one variable                                          | 15 | Solve: $5x - 3 < 3x + 1$                                                                                                     | 2011-12<br>(Short)            |
| 1 | 6 | Algebraic solution of linear inequalities in one variable                                          | 16 | Solve the linear inequality $4x + 3 < 5x + 7$                                                                                | 2015-16<br>(Short)            |
| 1 | 6 | Algebraic solution of linear inequalities in one variable                                          | 17 | Solve: $5x - 3 < 3x - 1$ when $x$ is a real number.                                                                          | 2020-21<br>(Long)             |
| 1 | 6 | Algebraic solution of linear inequalities in one variable                                          | 18 | Solve: $\frac{(2x+4)}{(x-1)} \geq 5$ .                                                                                       | 2020-21<br>(Long)             |
| 1 | 8 | Graphical solution of linear inequalities in two variables                                         | 19 | Solve the inequality graphically $ y - x  \leq 3$                                                                            | 2019-20<br>(Long)             |
| 1 | 6 | Algebraic solution of linear inequalities in one variable                                          | 20 | Solve the inequality: $x - 4 \geq 10$                                                                                        | 2020-21<br>(Short)            |
| 1 | 7 | Algebraic solution of linear inequalities in one variable and their representation on number line. | 21 | Solve $\frac{3x-4}{2} \geq \frac{x+1}{4} - 1$ . Show that the graph of the solution on the number line.                      | 2011-12<br>(Short)            |
| 1 | 7 | Algebraic solution of linear inequalities in one variable and their representation on number line. | 22 | Solve the system of inequalities:<br>$3x - 7 < 5 + x$<br>$11 - 5x \leq 1$<br>And represent the solutions on the number line. | 2011-12<br>(Long)             |
| 1 | 7 | Algebraic solution of linear inequalities in one variable and their representation on number line. | 23 | Solve the inequality and represent it on number line:<br>$5(2x - 7) - 3(2x + 3) \leq 0$ ,<br>$2x + 19 \leq 6x + 47$          | 2018-19<br>(Long)             |

|   |   |                                                           |    |                                                                                                       |                    |
|---|---|-----------------------------------------------------------|----|-------------------------------------------------------------------------------------------------------|--------------------|
| 1 | 8 | Graphical solution of linear inequalities in two variable | 24 | Solve the following system of inequalities by graphical method:<br>$2x + y \geq 6, 3x + 4y \leq 12$   | 2015-16<br>(Short) |
| 1 | 8 | Graphical solution of linear inequalities in two variable | 25 | Exhibit graphically the solution set of linear inequalities:<br>$3x + 4y \geq 12, x \geq 0, y \geq 1$ | 2019-20<br>(Long)  |



## CO-Wise AKTU Question Bank

Course: B.Tech

Subject Name: Elementary Mathematics -I

Subject Code: BBT101

Semester: 1

| CO No. | Lect. No. | Syllabus Topic (As Per LP)                | Ques. No. | Question Statement (As Per AKTU)                                                                                        | Session            |
|--------|-----------|-------------------------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------|--------------------|
| 2      | 10        | Sum of n terms of A.P.                    | 1         | Find the sum of $3+6+9\ldots+30$ . (very short)                                                                         | 2021-22            |
| 2      | 12        | Geometric mean                            | 2         | Find the geometric mean between 1 and $\frac{9}{16}$ . (very short)                                                     | 2021-22            |
| 2      | 14        | Sum of n terms and infinite terms of G.P. | 3         | Given a G.P. with $a = 727$ and $7^{th}$ is 64. Determine $S_7$ . (short)                                               | 2021-22            |
| 2      | 15        | Some numerical problems                   | 4         | Is 184 a term of the sequence 3,7,11,...?                                                                               | 2019-20            |
| 2      | 9         | A.P. and its general terms                | 5         | Find the total no. of terms in arithmetic progression 3, 5, 7, ... , 51. (very short)                                   | 2022-23            |
| 2      | 15        | Some numerical problems                   | 6         | Find the sum of the series $0.7 + 0.77 + 0.777 + \ldots$ up to 20 terms. (short)                                        | 2022-23            |
| 2      | 13        | G.P. and its general term                 | 7         | Find the third term from the last of geometric progression $\frac{2}{27}, \frac{2}{9}, \frac{2}{3}, \ldots$ 162. (long) | 2022-23            |
| 2      | 11        | Some numerical problems related to A.P.   | 8         | If $S_n$ denotes the sum of first n terms of A.P. and find the value of $\frac{S_{3n}-S_{n-1}}{S_{2n}-S_{2n-1}}$        | 2022-23            |
| 2      | 10        | Sum of n terms of A.P.                    | 9         | Which term of the A.P.: 3,8,13,..... is 248?                                                                            | 2011-12<br>(Short) |
| 2      | 10        | Sum of n terms of A.P.                    | 10        | Find the nth term of an A.P 5,8,11,.....                                                                                | 2015-16<br>(Short) |
| 2      | 10        | Sum of n terms of A.P.                    | 11        | Which term of the A.P. 3,8,13,... is 248?                                                                               | 2018-19<br>(Short) |
| 2      | 10        | Sum of n terms of A.P.                    | 12        | Which term of the A.P.: 3,8,13,... is 78?                                                                               | 2020-21<br>(Long)  |

|   |      |                                            |    |                                                                                                                                                                     |                    |
|---|------|--------------------------------------------|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 2 | 9    | A.P. and its general terms                 | 13 | If $a_n = 5 - 11n$ find the common difference.                                                                                                                      | 2020-21<br>(Short) |
| 2 | 9    | A.P. and its general terms                 | 14 | The first term of A.P is 2 and last term is 59. Find common difference if sum of all its terms is 610                                                               | 2015-16<br>(Long)  |
| 2 | 11   | Some numerical problems related to A.P.    | 15 | The ratio of the sum of $m$ and $n$ terms of an A.P. is $m^2 - n^2$<br>Show that the ratio of $m^{th}$ and $n^{th}$ term is $(2m-1):(2n-1)$                         | 2018-19<br>(Long)  |
| 2 | 10   | Sum of n terms of A.P.                     | 16 | Find the sum of $2+4+6+\dots+20$ .                                                                                                                                  | 2019-20<br>(Short) |
| 2 | 10   | Sum of n terms of A.P.                     | 17 | Find the sum of $3+6+9+\dots+30$ .                                                                                                                                  | 2020-21<br>(Short) |
| 2 | 9,10 | A.P. and its general terms, Sum of n terms | 18 | The third term of an A.P is 7 and the seventh term is 2 more than 3 times the third term. Find the first term, the common difference and the sum of first 20 terms. | 2011-12<br>(Long)  |
| 2 | 9,10 | A.P. and its general terms, Sum of n terms | 19 | Find four numbers in A.P. whose sum is 20 and the sum of square is 120.                                                                                             | 2019-20<br>(Long)  |
| 2 | 9,10 | A.P. and its general terms, Sum of n terms | 20 | The first term of an A.P. is 5, the last term is 45 and the sum is 400. Find the number of terms and the common difference.                                         | 2020-21<br>(Long)  |
| 2 | 12   | Geometric mean                             | 21 | The third term of G.P. is 4. Find the product of its first five terms.                                                                                              | 2019-20<br>(Long)  |
| 2 | 14   | Sum of n terms and infinite terms of G.P.  | 22 | Find the sum $\sqrt{7}, \sqrt{21}, 3\sqrt{7}, \dots, n$ terms.                                                                                                      | 2018-19<br>(Long)  |
| 2 | 14   | Sum of n terms and infinite terms of G.P.  | 23 | Find four numbers forming G.P. in which the third term is greater than the first term by 9, and the second term is greater than the fourth term by 18.              | 2018-19<br>(Long)  |
| 2 | 14   | Sum of n terms and infinite terms of G.P.  | 24 | Find three numbers in G.P. whose sum is 38 and their product is 1728.                                                                                               | 2019-20<br>(Long)  |
| 2 | 14   | Sum of n terms and infinite terms of G.P.  | 25 | Find the five geometric mean terms between 273 and 486                                                                                                              | 2013-14<br>(Long)  |
| 2 | 12   | Relation between G.P                       | 26 | Find two positive numbers whose difference is 12 and whose A.M exceed the G.M by 2                                                                                  | 2011-12<br>(Short) |

|   |    |                                           |    |                                                                           |                   |
|---|----|-------------------------------------------|----|---------------------------------------------------------------------------|-------------------|
| 2 | 14 | Sum of n terms and infinite terms of G.P. | 27 | Find the sum to n terms of the series whose $n^{th}$ term is $n(n + 3)$ . | 2015-16<br>(Long) |
|---|----|-------------------------------------------|----|---------------------------------------------------------------------------|-------------------|



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Semester: I

| CO No. | Lect. No. | Syllabus Topic (As Per LP)       | Ques. No. | Question Statement (As Per AKTU)                                                                                                                       | Session         |
|--------|-----------|----------------------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 3      | 27        | Standard equation of circle      | 1         | Find the equation of circle whose center is (2,3) and radius 5. (very short)                                                                           | 2021-22,2022-23 |
| 3      | 28        | Standard equation of parabola    | 2         | Write the focus of parabola $x^2 = 4y$ . (very short)                                                                                                  | 2021-22         |
| 3      | 20        | Point slope form, Intercept form | 3         | Reduce the following equation into slope-intercept form and intercept form : $3x - 4y = 12$ . (short)                                                  | 2021-22         |
| 3      | 25        | Distance of a point from line    | 4         | Find the distance of the point (4,1) from the line $3x - 4y + 12 = 0$ . (long)                                                                         | 2021-22         |
| 3      | 27        | Properties of Ellipse            | 5         | Find the length of major and minor axis, co-ordinates of foci and length of latus rectum for the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ . (long) | 2021-22         |
| 3      | 17        | Straight lines                   | 6         | Find the slope of straight line passing through a point A(-3, 6) and the mid-point of the line joining the points B(4, -5) and C(-2, 9). (very short)  | 2022-23         |
| 3      | 25        | Distance of a point              | 7         | Let A(1,1) and B(3,2) be the two points. If C is a point on x-axis such that AC+BC is minimum then find co-ordinates of C. (long)                      | 2022-23         |
| 3      | 28        | Standard equation of parabola    | 8         | Show that the equation $16x^2 + y^2 + 8xy - 74x - 78y + 212 = 0$ . (long)                                                                              | 2022-23         |
| 3      | 24        | Pair of intersecting lines       | 9         | Find the coordinates of the point which divides the line segment joining the points (1,-2,3) and (3,4,-5) in the ratio 2:3 externally.                 | 2011-12 (Long)  |
| 3      | 25        | Distance of a point from line    | 10        | Show that the points A(1,2,3), B(3,4,7) and C(-3,-2,-5) are collinear.                                                                                 | 2011-12 (Short) |

|   |    |                                                              |    |                                                                                                                                                                          |                    |
|---|----|--------------------------------------------------------------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 3 | 25 | Distance of a point from line                                | 11 | Find the value of $x$ for which the points $(x, -1)$ , $(2, 1)$ and $(4, 5)$ are collinear.                                                                              | 2011-12<br>(Long)  |
| 3 | 17 | Condition of parallel and perpendicularity between two lines | 12 | Find the value of $y$ so that the line through $(3, y)$ and $(2, 7)$ is parallel to the line through $(-1, 4)$ and $(0, 6)$                                              | 2011-12<br>(Short) |
| 3 | 17 | Condition of parallel and perpendicularity between two lines | 13 | Find the equation of line parallel to the line $3x - 4y + 2 = 0$ and passing through the point $(-2, 3)$ .                                                               | 2018-19<br>(Long)  |
| 3 | 17 | Condition of parallel and perpendicularity between two lines | 14 | Write the condition of perpendicularity of two lines.                                                                                                                    | 2019-20<br>(Short) |
| 3 | 18 | Angle between two lines                                      | 15 | If the angle between two lines is $\frac{\pi}{4}$ and the slope of one line $\frac{1}{2}$ , find the slope of the other line.                                            | 2020-21<br>(Long)  |
| 3 | 20 | Point slope form, Intercept form                             | 16 | Write the equation of straight line in point slope form.                                                                                                                 | 2019-20<br>(Short) |
| 3 | 20 | Point slope form, Intercept form                             | 17 | Find the equation of straight line joining the points $(-1, 3)$ and $(4, -2)$ .                                                                                          | 2019-20<br>(Long)  |
| 3 | 20 | Point slope form, Intercept form                             | 18 | Find the equation of line passing through the point $(2, 2)$ and cutting off intercepts on the axis whose sum is 9.                                                      | 2015-16<br>(Long)  |
| 3 | 20 | Point slope form, Intercept form                             | 19 | Find the equation of the straight line which passes through the point $(3, 4)$ and the intercept made by this line on $y$ -axis is two times the intercept on $x$ -axis. | 2013-14<br>(Long)  |
| 3 | 20 | Point slope form, Intercept form                             | 20 | Find the equation of line in intercept form.                                                                                                                             | 2018-19<br>(Short) |
| 3 | 21 | Equation of a line in normal form                            | 21 | Reduce the following equations into normal form and find their perpendicular distances from the origin<br>(i) $x - \sqrt{3}y + 8 = 0$<br>$y - 2 = 0$                     | 2018-19<br>(Long)  |
| 3 | 27 | Standard equation of circle                                  | 22 | Does the point $(5/2, 7/2)$ lie inside, outside or on the circle $x^2 + y^2 = 25$ ?                                                                                      | 2011-12<br>(Long)  |

|   |    |                                |    |                                                                                                                                          |                               |
|---|----|--------------------------------|----|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 3 | 27 | Standard equation of circle    | 23 | Find the centre and radius of the circle $x^2 + y^2 - 4x + 6y = 12$                                                                      | 2011-12<br>(Short)            |
| 3 | 27 | Standard equation of circle    | 24 | Find the equation of the circle whose radius is 5 and which touches externally the circle $x^2 + y^2 - 2x - 4y = 20$ at the point (5,5). | 2011-12<br>(Long)             |
| 3 | 27 | Standard equation of circle    | 25 | Find the equation of the circle which passes through the points (0,1),(1,0) and (2,1).Also find its radius and coordinate of the center. | 2013-14<br>(Long)             |
| 3 | 27 | Standard equation of circle    | 26 | Find the equation of circle whose center is (3,2) and radius is 5.                                                                       | 2015-16<br>(Short)            |
| 3 | 27 | Standard equation of circle    | 27 | Find the equation of circle passing through (4,1) and (6,5), whose center is on the line $4x + y = 16$                                   | 2018-19<br>(Long)             |
| 3 | 27 | Standard equation of circle    | 28 | Find the equation of circle whose center is (2,3) and radius is 8.                                                                       | 2020-21<br>(Short)            |
| 3 | 27 | Standard equation of circle    | 29 | Find the equation of circle, the coordinates of whose diameter are (-1,2) and (4,-3).                                                    | 2020-21<br>(Long)             |
| 3 | 28 | Standard equation of parabola  | 30 | Write the focus of the parabola: $x^2 = 8y$ .                                                                                            | 2018-19<br>2020-21<br>(Short) |
| 3 | 28 | Standard equation of parabola  | 31 | Find the equation of parabola whose focus is the point $(-1, -2)$ and whose directrix is straight line $x - 2y + 3 = 0$                  | 2019-20<br>2020-21<br>(Long)  |
| 3 | 28 | Standard equation of parabola  | 32 | Find eccentricity, co-ordinate of foci and length of latus rectum for the ellipse $\frac{x^2}{36} + \frac{y^2}{16} = 1$                  | 2015-16<br>(Long)             |
| 3 | 28 | Standard equation of hyperbola | 33 | Find the equation of the hyperbola whose foci are $(0, \pm 12)$ and the length of the latus rectum is 36                                 | 2011-12<br>(Long)             |
| 3 | 28 | Standard equation of hyperbola | 34 | Find the equation of hyperbola having directrix $x + 2y = 1$ , focus(2,1) and eccentricity 2.                                            | 2013-14<br>(Long)             |

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Subject Name: Elementary Mathematics-I

Subject Code: BBT-101

Semester: 1

| CO No. | Lect. No. | Syllabus Topic (As Per LP)                        | Ques. No. | Question Statement (As Per AKTU)                                                                                                                  | Session            |
|--------|-----------|---------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 4      | 32        | Derivative of sum and Product functions           | 1         | If $y=(1-2x^2) \sin x$ then find $\frac{dy}{dx}$                                                                                                  | 2022-23            |
| 4      | 37        | Derivatives of Parametric forms                   | 2         | If $y= \cot(\cos^{-1}x)$ then find $\frac{dy}{dx}$                                                                                                | 2022-23            |
| 4      | 38        | Derivatives of polynomial                         | 3         | Find the differential coefficient of $x^2 \tan^2 x$ with respect to $\log_e x$ .                                                                  | 2022-23            |
| 4      | 38        | Derivatives of polynomial, parametric forms       | 4         | If $x = \sqrt{a}^{\sin^{-1}t}$ and $y = \sqrt{a}^{\cos^{-1}t}$ then prove that $\frac{dy}{dx} = \frac{-y}{x}$                                     | 2022-23            |
| 4      | 31        | Differentiability                                 | 5         | If $y = \sin x$ then find $\frac{dy}{dx}$ at $x=0$                                                                                                | 2021-22            |
| 4      | 29        | Introduction, Definition of limit                 | 6         | Evaluate: $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}$                                                                                          | 2021-22            |
| 4      | 29        | Introduction, Definition of limit                 | 7         | Evaluate: $\lim_{x \rightarrow 0} \frac{\sin 5x}{\sin 2x}$                                                                                        | 2021-22            |
| 4      | 39        | Differentiability<br>Logarithmic differentiation. | 8         | Find $\frac{dy}{dx}$ if $y = \sin \sqrt{1 + \log(\tan x)}$                                                                                        | 2021-22            |
| 4      | 30        | Continuity                                        | 9         | Find the value of k so that the function f is continuous at indicated value of $f(x) = f(x) = \begin{cases} kx, x \leq 2 \\ 3, x > 2 \end{cases}$ | 2021-22            |
| 4      | 29        | Introduction, Definition of limit                 | 10        | Evaluate: $\lim_{x \rightarrow 0} \left( \frac{\sin 2x}{4x} \right)$ .                                                                            | 2020-21<br>(Short) |
| 4      | 29        | Introduction, Definition of limit                 | 11        | Evaluate the given limit: $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$                                                                          | 2018-19<br>(Short) |

|   |    |                                             |    |                                                                                                                       |                    |
|---|----|---------------------------------------------|----|-----------------------------------------------------------------------------------------------------------------------|--------------------|
| 4 | 29 | Introduction, Definition of limit           | 12 | Find $\lim_{x \rightarrow 0} f(x)$ , where $f(x) = \begin{cases} \frac{ x }{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$ | 2018-19<br>(Long)  |
| 4 | 34 | Derivatives of polynomial                   | 13 | Find the derivative of $x^2 - 2$ at $x = 100$ .                                                                       | 2018-19<br>(Short) |
| 4 | 34 | Derivatives of Trigonometric functions      | 14 | Find the derivative of $\sec^2 x$ .                                                                                   | 2018-19<br>(Short) |
| 4 | 31 | Differentiability                           | 16 | Discuss the differentiability of $f(x) = x^2$ at $x = 1$ .                                                            | 2019-20<br>(Short) |
| 4 | 29 | Introduction, Definition of limit           | 17 | Evaluate: $\lim_{x \rightarrow 0} \frac{3x^2 - 2x + 1}{x - 1}$                                                        | 2019-20<br>(Short) |
| 4 | 29 | limit                                       | 20 | What is the value of $\lim_{x \rightarrow -1} [1 + x + x^2 + \dots \dots \dots + x^{10}]$ .                           | 2011-12<br>(Short) |
| 4 | 32 | Differentiation                             | 21 | Find the differential coefficient of $\sin x \cos x$                                                                  | 2012-13<br>(Short) |
| 4 | 34 | Derivatives of polynomial                   | 22 | Compute $\frac{dy}{dx}$ where $y = \sin x + \tan(x^2) + x^4$                                                          | 2012-13<br>(Long)  |
| 4 | 34 | Derivatives of polynomial                   | 23 | Find the derivative of $y = 9x^2 + \frac{3}{x} + 5 \tan^{-1} x$ with respect of $x$                                   | 2013-14<br>(Short) |
| 4 | 29 | Introduction, Definition of limit           | 24 | Evaluate: $\lim_{x \rightarrow 0} \frac{\sin 5x}{\sin 2x}$                                                            | 2012-13<br>(Short) |
| 4 | 29 | Introduction, Definition of limit           | 25 | Find the value of:<br>$\lim_{x \rightarrow 2} \left[ \frac{x^3 - 4x^2 + 4x}{x^2 - 4} \right]$                         | 2012-13<br>(Long)  |
| 4 | 29 | Introduction, Definition of limit           | 26 | Show that: $\lim_{x \rightarrow 0} (1 + x)^{\frac{1}{x}} = e$                                                         | 2012-13<br>(Long)  |
| 4 | 34 | Derivatives of polynomial, parametric forms | 27 | Find $\frac{dy}{dx}$ if $y = \sin(\sqrt{\sin x + \cos x})$                                                            | 2013-14<br>(Long)  |

|   |    |                                             |    |                                                                                                            |                              |
|---|----|---------------------------------------------|----|------------------------------------------------------------------------------------------------------------|------------------------------|
| 4 | 29 | Introduction, Definition of limit           | 28 | Evaluate: $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}$                                                   | 2013-14<br>(Long)            |
| 4 | 29 | Introduction, Definition of limit           | 29 | Evaluate: $\lim_{x \rightarrow 0} \left( \frac{3^x - 2^x}{x} \right)$                                      | 2013-14<br>(Long)            |
| 4 | 32 | Derivative of sum and Product functions     | 30 | If $y = \frac{1}{\tan x} - \frac{1}{\cot x}$ , then find $\frac{dy}{dx}$ .                                 | 2014-15<br>(Short)           |
| 4 | 32 | Derivative of sum and Product functions     | 31 | Find the derivative $y = \frac{1}{\tan x} + \frac{1}{\cot x}$                                              | 2015-16<br>(Short)           |
| 4 | 29 | Introduction, Definition of limit           | 32 | Evaluate: $\lim_{x \rightarrow 0} \left( \frac{e^x + e^{-x} - 2}{x^2} \right)$                             | 2014-15<br>(Long)            |
| 4 | 29 | Introduction, Definition of limit           | 33 | Evaluate: $\lim_{\theta \rightarrow \frac{\pi}{2}} \left( \frac{1 - \cos 4\theta}{\sin 2\theta} \right)$ . | 2014-15<br>(Short)           |
| 4 | 30 | Continuity                                  | 34 | Test the existence of function $f(x) =  x $ at $x = 0$ .                                                   | 2014-15<br>(Short)           |
| 4 | 29 | Introduction, Definition of limit           | 35 | Evaluate: $\lim_{x \rightarrow 2} \left( \frac{x^5 - 32}{x^3 - 8} \right)$                                 | 2015-16<br>(Long)            |
| 4 | 37 | Derivatives of Parametric forms             | 36 | If $y = \sin^{-1}(m \sin x)$ , find $\frac{dy}{dx}$ .                                                      | 2019-20<br>2020-21<br>(Long) |
| 4 | 32 | Derivative of sum and Product functions     | 37 | Find $\frac{dy}{dx}$ if $y = x \log x$                                                                     | 2020-21<br>(Short)           |
| 4 | 38 | Derivatives of polynomial                   | 38 | Differentiate $x^2$ with respect to $x^3$ .                                                                | 2020-21<br>(Long)            |
| 4 | 34 | Derivatives of polynomial, parametric forms | 39 | If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \cdots \infty}}}$ , find $\frac{dy}{dx}$ .            | 2020-21<br>(Long)            |
| 5 | 37 | Derivatives of Parametric form              | 40 | Differentiate $(\cos x)^x$ with respect to $x$ .                                                           | 2019-20<br>(Long)            |
| 5 | 37 | Derivatives of Parametric forms             | 41 | Find $\frac{dy}{dx}$ if $y = (\log x)^{\cos x} + x^{\sin x}$ .                                             | 2018-19<br>(Long)            |

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Subject Code: BBT-101

Semester: 1

| CO No. | Lect. No. | Syllabus Topic (As Per LP)                                                      | Ques. No. | Question Statement (As Per AKTU)                                                                                                                                                           | Session                       |
|--------|-----------|---------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 5      | 39        | Applications of Derivatives as rate change                                      | 1         | Find the rate of change of area of a Circle with respect to its Circumference at radius 3 Cm                                                                                               | 2022-23                       |
| 5      | 42        | Approximations & Errors and Simple problems (that illustrate basic principles)  | 2         | Find the approximate value of $(1.0002)^{3000}$ Using Differentiation.                                                                                                                     | 2022-23                       |
| 5      | 38        | Lagrange's Mean Value Theorem                                                   | 3         | Find the area bounded by the Coordinate axis and normal to the curve $y = \log_e x$ at the point P(1,0)                                                                                    | 2022-23                       |
| 5      | 38        | Lagrange's Mean Value Theorem (without proof) and its geometric interpretations | 4         | Verify Lagrange's mean value theorem if $f(x) = x(x-1)(x-2)$ in the interval $[0, 1/2]$ .                                                                                                  | 2022-23                       |
| 5      | 43        | Maxima and minima of one variable.                                              | 5         | Let $p(x)$ be a real polynomial of least degree which has a local maximum at $x=1$ and a local minimum at $x=3$ . If $p(1)=6$ , $p(3)=2$ , then find the value of $\frac{dp}{dx}$ at $x=0$ | 2022-23                       |
| 5      | 37        | Rolle's Theorem (without proof) and its geometric interpretations               | 6         | State Rolle's Theorem                                                                                                                                                                      | 2021-22                       |
| 5      | 43        | Maxima and minima of one variable.                                              | 7         | Find maximum & minimum value of $y = x^3 - 3x^2 + 3$                                                                                                                                       | 2021-22                       |
| 5      | 38        | Lagrange's Mean Value Theorem                                                   | 8         | Verify mean value theorem if $y = x^2 + 2x + 3$ in the interval $[4,6]$ .                                                                                                                  | 2021-22                       |
| 5      | 38        | Lagrange's Mean Value Theorem                                                   | 9         | Find the equation of tangent and normal to the curve $y = x^2 + 2$ at the point P(1,3)                                                                                                     | 2021-22                       |
| 5      | 38        | Lagrange's Mean Value Theorem                                                   | 10        | Write the statement of Lagrange's Mean Value Theorems.                                                                                                                                     | 2012-13<br>2015-16<br>2019-20 |

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|   |    |                                                                                |    |                                                                                                                               | 2020-21<br>(Short)           |
| 5 | 38 | Lagrange's Mean Value Theorem                                                  | 11 | Verify LMVT for the function<br>$f(x) = x^3 - 18x^2 + 99x - 162$ on $[3, 5]$ .                                                | 2019-20<br>2020-21<br>(Long) |
| 5 | 38 | Lagrange's Mean Value Theorem                                                  | 12 | Find the equation of normal to the curve $y = x + \sin x \cos x$ at<br>$x = \pi/2$                                            | 2019-20<br>(Short)           |
| 5 | 42 | Approximations & Errors and Simple problems (that illustrate basic principles) | 13 | If $y = x^4 - 10$ and if $x$ changes from 2 to 1.99, what is approximate change in $y$ .                                      | 2019-20<br>(Long)            |
| 5 | 41 | Tangents & Normals to the given curve                                          | 14 | Find the equation of tangent intercepts of a line on $x$ axis and $y$ axis respectively.                                      | 2020-21<br>(Short)           |
| 5 | 41 | Tangents & Normals to the given curve                                          | 15 | Find the equation of the tangent to the curve<br>$y = -5x^2 + 6x + 7$ at the point $\left(\frac{1}{2}, \frac{35}{4}\right)$ . | 2020-21<br>(Long)            |
| 5 | 43 | Maxima and minima of one variable.                                             | 16 | Find the maximum and minimum values of function<br>$f(x) = \sin 3x + 4 \forall x \in (-\pi/2, \pi/2)$ .                       | 2019-20<br>2020-21<br>(Long) |
| 5 | 38 | Lagrange's Mean Value Theorem                                                  | 17 | Verify mean value theorem if $f(x) = 3x^2 - 4x - 3$ in the interval $[1, 4]$ .                                                | 2018-19<br>(Long)            |
| 5 | 41 | Tangents & Normals to the given curve                                          | 18 | Find the slope of the tangent to the curve $y = 3x^4 - 4$ at $x = 4$ .                                                        | 2018-19<br>(Short)           |
| 5 | 41 | Tangents & Normals to the given curve                                          | 19 | Find the equation of all lines having slope 2 and tangent to the curve: $y + \frac{2}{x-3} = 0$ .                             | 2018-19<br>(Long)            |
| 5 | 37 | Rolle's Theorem (without proof) and its geometric interpretations              | 20 | Is Rolle's Theorem applicable to the function<br>$f(x) = (x-1)(x-4)e^{-x}, x \in [0, 4]$                                      | 2011-12<br>(Short)           |
| 5 | 38 | Lagrange's Mean Value Theorem                                                  | 21 | Write the statement of Lagrange's Mean Value Theorems.                                                                        | )                            |

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| 5 | <b>42</b> | Approximations & Errors and Simple problems (that illustrate basic principles) | <b>22</b> | Find the approximate value of $f(3.02)$<br>Where $f(x) = 3x^2 + 5x + 3$                                                  | 2014-15<br>(Long) |
| 5 | <b>41</b> | Tangents & Normals to the given curve                                          | <b>23</b> | Find the slope of the tangent to the curve $y = x^3 - x$ at $x = 2$                                                      | 2011-12<br>(Long) |
| 5 | <b>41</b> | Tangents & Normals to the given curve                                          | <b>24</b> | Find the equation of the tangent to the curve $y = \frac{x-7}{(x-2)(x-3)}$ at the point where it cuts the $x$ -axis      | 2013-14<br>(Long) |
| 5 | <b>42</b> | Approximations & Errors and Simple problems (that illustrate basic principles) | <b>25</b> | Find the approximate change in the volume $V$ of a cube of side $x$ meters caused by increasing the sides by 2%.         | 2013-14<br>(Long) |
| 5 | <b>41</b> | Tangents & Normals to the given curve                                          | <b>26</b> | Find the slope of curve $y = 3x^4 - 4x^2 + 6$ at $(1, -1)$ and $(-1, 2)$                                                 | 2014-15<br>(Long) |
| 5 | <b>41</b> | Tangents & Normals to the given curve                                          | <b>27</b> | Find the point at which the tangent to the curve $y = \sqrt{4x-3} - 1$ has its slope $2/3$                               | 2014-15<br>(Long) |
| 5 | <b>43</b> | Maxima and minima of one variable.                                             | <b>28</b> | Show that semi-vertical angle of right circular cone of given surface area and maximum volume is $\sin^{-1} \frac{1}{3}$ | 2015-16<br>(Long) |
| 5 | <b>43</b> | Maxima and minima of one variable.                                             | <b>29</b> | Find the critical points of $y = 9x^2 + 12x + 2$                                                                         | 2012-13<br>(Long) |
| 5 | <b>43</b> | Maxima and minima of one variable.                                             | <b>30</b> | Find the Maxima and Minima for the function $f(x) = x + \sin 2x$ in interval $0 \leq x \leq 2\pi$                        | 2014-15<br>(Long) |