B.Tech. 2nd Sem Regular & Reappear May 2

University Institute of Engineering & Technology
(Recognised Under Section 2(f) and 12B of UGC)
Kurukshetra University, Kurukshetra

Roll No. -

52013

THEORY EXAMINATION – MAY 2019

B.TECH – BIOTECH. | SEMESTER - II

TIME – 3 Hrs.

M.M. - 75

COURSE NO. – BS-132

COURSE TITLE – APPLIED MATHEMATICS-II

Note: All questions in Part-A and Part-B are compulsory. Attempt any four questions from Part-C selecting at least one from each unit.

PART-A

Q 1. Answer the following multiple choice questions: (15×1)

1(i). Determinant of the matrix $\begin{bmatrix} 1 & 0 & 3 \\ 2 & -1 & 4 \\ -1 & 3 & 3 \end{bmatrix}$ is .....

1(ii) Rank of a Unit (Identity) matrix of order 4 is equal to ....

1(iii) The maximum value of the rank 4×5 order matrix is....

1(iv) A given square matrix [A] is called orthogonal if....

1(v) Find the equation whose roots are 2 times the roots of $x^3+2x^2-4x+1=0$ is...

1(vi) Normal equations for the best fitting of an equation of the type $y=a+bx+cx^2$ to any data are given by....

1(vii) Find the equation whose one root being $2+\sqrt{3i}$.

1(viii) What is the order and degree of the differential equation $\left(\frac{dy}{dx}\right)^2+4=3y$.

1(ix) $Mdx+Ndy=0$, is an exact differential equation if...

1(x) If $Mdx+Ndy=0$, is an exact differential equation, its solution is given by....

1(xi) The general solution of 2nd order differential equation contains..... arbitrary constants.

1(xii) Integrating factor for the differential equation $\frac{dy}{dx}+\frac{y}{x\log x}=4.$ is given by...

1(xiii) If $u=x^2, v=y^2$, *find* $\frac{\partial(u,v)}{\partial(x,y)}$.

1(xiv) Is the given function $u = \sin^{-1}\left(\frac{x^2+y^2}{x-y}\right)$, homogeneous ?

1(xv) State the Euler's theorem for homogeneous functions.

PART-B (4×5)

Q 2. Find the rank of the matrix $\begin{bmatrix} 1 & 0 & 3 \\ 2 & -1 & 4 \\ -1 & 3 & 3 \end{bmatrix}$.

Q 3. Using Synthetic division method, find an equation whose roots are diminished by 2 from the roots of the equation $3x^5+5x^4-2x^3+2x^2-5x-3=0$.

Q 4. Form the differential equation from the equation $y = e^x(A\cos x + B\sin x)$, by elimination of arbitrary constants.

Q 5. If $z = e^{ax+by}.f(ax-by)$, prove that $b\frac{\partial z}{\partial x}+a\frac{\partial z}{\partial x}=2abz$.

PART-C (4×10)

Unit-1

Q 6. Using Gauss Jordan Method find the inverse of the matrix $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$.

Q 7. Test for the consistency and solve the equations $2x-3y+7z=5$, $3x+y-3z=13$, $2x+19y-47z=32$.

Unit-2

Q 8. Solve the reciprocal equation $3x^5+5x^4-2x^3+2x^2-5x-3=0$.

Q 9. By method of least square, find the straight line that best fits the following data:

x	1	2	3	4	5
y	14	27	40	55	68

Unit-3

Q 10. Using Variable Separable method, solve the differential equation $\frac{dy}{dx}=\sin(x+y)+\cos(x+y)$.

Q 11. Solve the differential equation $\left(3x^2+6xy^2\right)dx+\left(6x^2y+4y^3\right)dy=0$.

Unit-4

Q 12. If $u = \tan^{-1}\left(\frac{x^3+y^3}{x-y}\right)$, prove that, $x^2\frac{\partial^2 u}{\partial x^2}+2xy\frac{\partial^2 u}{\partial x\partial y}+y^2\frac{\partial^2 u}{\partial y^2}=2\cos 3u.\sin u$

Q 13. Examine $f(x,y)=x^3+y^3-3axy$ for maximum and minimum values.