K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU-560109

DEPARTMENT OF BASIC SCIENCE

SESSION: 2021-2022 (EVEN SEMESTER)

ASSIGNMENT-I

Academic Year	2021-22		
Batch	2021-22		
Year/Semester/Section	Common to all Branches-II SEM	**Dept**	**Mathematics**
Subject Code-Title	21MAT21 – ADVANCED CALCULUS AND NUMERICAL METHODS		
Name of the Instructor	DIVYA R		

Assignment No: 1 **Total marks:15**
Date of Issue: 20/06/2022 **Date of Submission: 4/07/2022**

Sl. No.	Assignment Questions	K Level	CO	Marks
1.	**Form** the partial differential equation by eliminating arbitrary functions from. a) $\emptyset(x+y+z, x^2+y^2+z^2)=0$ b) $lx+my+nz=\emptyset(x^2+y^2+z^2)$ c) $z=f\left(\frac{xy}{z}\right)$ d) $z=e^{ax+by}f(ax-by)$	K3 Applying	CO1	1
2.	**Solve** PDE by direct integration method. $\frac{\partial^2 z}{\partial x\,\partial t}=e^{-t}\cos x$ given $z=0$ when $t=0$ and $\frac{\partial z}{\partial t}=0$ when $x=0$	K3 Applying	CO1	1
3.	**Solve** $\frac{\partial^2 z}{\partial x\,\partial y}=\sin x\sin y$, for which $\frac{\partial z}{\partial y}=-2\sin y$, when $x=0$ and $z=0$, when y is an odd multiple of $\frac{\pi}{2}$.	K3 Applying	CO1	1
4.	**Solve** $\frac{\partial^2 z}{\partial y^2}=z$, given that, when $y=0, z=e^x$ and $\frac{\partial z}{\partial y}=e^{-x}$	K3 Applying	CO1	1

5.	**Solve** $\frac{\partial^2 z}{\partial x^2} + 3\frac{\partial z}{\partial x} - 4z = 0$ subject to the condition that $z = 1$ and $\frac{\partial z}{\partial x} = y$ when $x = 0$	K3 Applying	**CO1**	1
6.	a) **Solve** $(y - z)p + (z - x)q = (x - y)$. b) **Solve** $(y^2 + z^2)p + x(yq - z) = 0$.	K3 Applying	**CO1**	1
7.	**Derive** one dimensional heat and wave equation in the standard form.	K3 Applying	**CO1**	1
8.	**Compute** the real root of $x\log_{10}x - 1.2 = 0$, correct to four decimals by using Regula Falsi method.	K3 Applying	**CO2**	1
9.	**Find** a real root of $x\log_{10}x - 1.2 = 0$, by correct to four decimal places, using Regula falsi method the root lies between (2,3).	K3 Applying	**CO2**	1
10.	**Find** a real root of the equation $x^3 + x^2 + 3x + 4 = 0$, by performing two itertions using Newton – Raphson method.	K3 Applying	**CO2**	1

18/6/2022

Course In charge

28/06/22

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K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU-560109

DEPARTMENT OF BASIC SCIENCE

SESSION: 2021-2022 (EVEN SEMESTER)

ASSIGNMENT-II

Academic Year	2021-22		
Batch	2021-22		
Year/Semester/Section	Common to all Branches-II SEM	**Dept**	**Mathematics**
Subject Code-Title	21MAT21 – ADVANCED CALCULUS AND NUMERICAL METHODS		
Name of the Instructor	Manoharkumar K N		

Assignment No: 2 **Total marks:15**
Date of Issue: 22/07/2022 **Date of Submission: 4/08/2022**

Sl. No.	Assignment Questions	K Level	CO	Marks
1.	From the following data, **find** the number of students who have obtained (i) less than 45 marks (ii)between 40 and 45 marks. Marks | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 No. of Students | 31 | 42 | 51 | 35 | 31	K3 Applying	CO2	1
2.	Given f(40) = 184, f(50) = 204, f(60) = 226, f(70) = 250, f(80) = 276, f(90) = 304 , **find** f(38) using Newton's forwrd interpolation formula .	K3 Applying	CO2	1
	Using Newton's divided difference interpolation, **find** the polynomial of the given data x | 3 | 7 | 9 | 10 f(x) | 168 | 120 | 72 | 63	K3 Applying	CO2	1
4.	**Find** the polynomial f(x) by using Lagrange's formula from the following data: x | 0 | 1 | 2 | 5 f(x) | 2 | 3 | 12 | 147	K3 Applying	CO2	1
5.	Use Lagrange'sinterpolation formula to fit a polynomial for the data: X | 0 | 1 | 3 | 4 y | -12 | 0 | 6 | 12 Hence **estimate** y at x=2	K3 Applying	CO2	1

6.	a) Use Taylor's series method to **find** y at $x = 0.1, 0.2, 0.3$ considering the terms upto the third degree given that $\frac{dy}{dx} = x^2 + y^2$ and $y(0) = 1$ b)Employ Taylor's series method to **find** $y(0.1)$ given that $\frac{dy}{dx} - 2y = 3e^x$ whose solution passes through the origin	K3 Applying	**CO3**	2
7.	a) Given $\frac{dy}{dx} = 1 + \frac{y}{x}$, $y = 2$ at $x = 1$, **find** the pproximate value of y at $x = 1.4$ by taking step size $h = 0.2$ applying Modified Euler's Method. b) Use Modified Euler's Method to **solve** $\frac{dy}{dx} = x + \lvert\sqrt{y}\rvert$ in the range $0 \le x \le 0.4$ by taking $h = 0.2$, given that $y = 1$ at $x = 0$ initially	K3 Applying	**CO3**	2
8.	Using Runge – Kutta method of fourth order, **find** $y(0.2)$ for the equation $\frac{dy}{dx} = \frac{y - x}{y + x}$, $y(0) = 1$ taking $h = 0.2$	K3 Applying	**CO3**	2
9.	Given $\frac{dy}{dx} = x - y^2$ and the data $y(0) = 0, y(0.2) = 0.02$, $y(0.4) = 0.0795, y(0.6) = 0.1762$, **compute** y at $x = 0.8$ by applying i) Milne's Method ii) Adam – Bashforth Method	K3 Applying	**CO3**	2
10.	The following table gives the solution of $5xy' + y^2 - 2 = 0$, **find** the value of y at $x = 4.5$ using Milne's predictor and corrector formula. Use corrector formula twice.	K3 Applying	**CO3**	2

Course In charge

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22/07/2

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DEPARTMENT OF BASIC SCIENCE

SESSION: 2021-2022 (EVEN SEMESTER)

ASSIGNMENT-III (Activity)

Academic Year	2021-22		
Batch	2021-22		
Year/Semester/Section	Common to all Branches-II SEM	**Dept**	**Mathematics**
Subject Code-Title	21MAT21 – ADVANCED CALCULUS AND NUMERICAL METHODS		
Name of the Instructor	Nagarathna T K		

Assignment No: 3 **Total marks:20**
Date of Issue: /08/2022 **Date of Submission: /08/2022**

Sl. No.	Assignment Questions	K Level	CO	Marks
1.	**Find** the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point $(2, -1, 2)$	K3 Applying	CO4	2
2.	*Find the directional derivatives of* $\emptyset = xy^2 + yz^3$ *at* $(2, -1, 1)$ *along* $i + 2j + 2k$.	K3 Applying	CO4	2
3.	If $\vec{F} = \nabla(xy^3z^2)$ **find** div$\vec{F}$ and curl$\vec{F}$ at the point $(1, -1, 1)$.	K3 Applying	CO4	2
4.	*If* $\vec{F} = (x + y + az)i + (bx + 2y - z)j + (x + cy + 2z)k$ *find* a, b, c *such that culf* $\vec{F} = \vec{0}$ *and then find* $\emptyset$ *such that* $\vec{F} = \nabla\emptyset$	K3 Applying	CO4	2
5.	*Find the value of the constnt* $'a'$*such that the vector field.* $\vec{F} = (xy - z^3)i + (a - 2)x^2j + (1 - a)xz^2k$ *is irrotational and hence find scalar function* $\emptyset$ *such that* $\vec{F} = \nabla\emptyset$	K3 Applying	CO4	2
6.	*Derive the relation between Gamma and Beta functions*	K3 Applying	CO5	2
7.	*Show that* $\int_0^{\frac{\pi}{2}} \sqrt{sin\theta}\, d\theta * \int_0^{\frac{\pi}{2}} \frac{d\theta}{\sqrt{sin\theta}} = \pi$	K3 Applying	CO5	2
8.	*Show that* $\gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$	K3 Applying	CO5	2
9.	*Evaluate* $\int_{-1}^{1}\int_{0}^{z}\int_{x-z}^{x+z}(x + y + z)\, dxdydz.$	K3 Applying	CO5	2
10.	**Evaluate** $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}}$ xyz dxdydz	K3 Applying	CO5	2

Course In charge

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