Sanjay Ghodawat University, Kolhapur 2019-20

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017 EXM/P/09/01

Year and Program:2019-20	**School of Science**	**Department of Mathematics**
B.Sc.I	Section-A	
Course Code: MTS 102	**Course Title: Mathematics II**	**Semester – II**
Day and Date: Monday 13/1/20	**End Semester Examination (ESE)**	**Time:** 1/2 hr 10.30 am to 11 am
		Max Marks: 100
PRN/Exam seat No:		**Answer booklet No:**
Student's signature:		**Invigilator signature:**

Instructions:

1) All questions are compulsory.
2) **Attempt Q.1 within first 30 minutes.**
3) Each MCQ type question is followed by four plausible alternatives, Tick (√) the correct one.
4) Answer to question 1 should be written in the question paper and submit to the Jr.Supervisor.
5) If you tick more than one option it will not be evaluated.
6) Figures to the right indicate full marks.
7) Use **Blue ball pen** only.

			Marks	Bloom's Levels	COs
Q1		**Choose the correct alternative for each of following**	**16**		
	a)	If the equation $M\ dx + N\ dy = 0$ is homogeneous and $Mx + Ny \neq 0$ then the integrating factor of $M\ dx + N\ dy = 0$ is i) $\frac{1}{Mx - Ny}$, ii) $\frac{1}{Mx + Ny}$, iii) $Mx + Ny$, iv) $Mx - Ny$.	02	L_1	CO1
	b)	The integrating factor of the differential equation $\frac{dy}{dx} = 2y + 3e^x$ is i) e^{-2x}, ii) e^{2x}, iii) e^{-2x^2}, iv) e^{2x^2}.	02	L_1	CO2
	c)	One of solution of the simultaneous differential equation $\frac{dx}{y-z} = \frac{dy}{z-x} = \frac{dz}{x-y}$ is i) $xyz = c_1$, ii) $x + y + z = c_1$, iii) $x^2yz = c_1$, iv) $x - y + z = c_1$.	02	L_1	CO3

d) The total differential equation $P\,dx + Q\,dy + R\,dz = 0$ is integrable if — 02 — L_1 — CO4

i) $P\left(\frac{\partial Q}{\partial z}+\frac{\partial R}{\partial y}\right)+Q\left(\frac{\partial R}{\partial x}+\frac{\partial P}{\partial z}\right)+R\left(\frac{\partial P}{\partial y}+\frac{\partial Q}{\partial x}\right)=0,$

ii) $P\left(\frac{\partial Q}{\partial z}-\frac{\partial R}{\partial y}\right)-Q\left(\frac{\partial R}{\partial x}-\frac{\partial P}{\partial z}\right)+R\left(\frac{\partial P}{\partial y}-\frac{\partial Q}{\partial x}\right)=0,$

iii) $P\left(\frac{\partial Q}{\partial z}-\frac{\partial R}{\partial y}\right)+Q\left(\frac{\partial R}{\partial x}-\frac{\partial P}{\partial z}\right)+R\left(\frac{\partial P}{\partial y}-\frac{\partial Q}{\partial x}\right)=0,$

iv) $\left(\frac{\partial Q}{\partial z}-\frac{\partial R}{\partial y}\right)+\left(\frac{\partial R}{\partial x}-\frac{\partial P}{\partial z}\right)+\left(\frac{\partial P}{\partial y}-\frac{\partial Q}{\partial x}\right)=0.$

e) If $u=\sin^{-1}\left(\frac{\sqrt{x}-\sqrt{y}}{\sqrt{x}+\sqrt{y}}\right)$ then $\frac{\partial u}{\partial y}$ is — 02 — L_1 — CO5

i) $-\frac{x}{y}\frac{\partial u}{\partial x}$, ii) $\frac{x}{y}\frac{\partial u}{\partial x}$, iii) $\frac{x^2}{y}\frac{\partial u}{\partial x}$, iv) $-\frac{x^2}{y}\frac{\partial u}{\partial x}$.

f) If $u=\cos\left(\frac{x}{y}\right)$ then the value of $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}$ is — 02 — L_1 — CO5

i) 1, ii) -1, iii) 0, iv) 2.

g) If $u=\frac{x^2+y^2}{x+y}$ then $x^2\frac{\partial^2 u}{\partial x^2}+2xy\frac{\partial^2 u}{\partial x\partial y}+y^2\frac{\partial^2 u}{\partial y^2}$ is — 02 — L_1 — CO5

i) 0, ii) 1, iii) -1, iv) 2.

h) The differential equation obtained by eliminating arbitrary constant form the relation $z=(x+a)(y+b)$ is — 02 — L_1 — CO6

i) $z=2pq$, ii) $z=pq^2$, iii) $z=p^2q$, iv) $z=pq$.

i) For the partial differential equation $q=2yp^2$, the complete integral is — 02 — L_1 — CO

i) $z=ax+ay+c$, ii) $z=ax+ay^2+c$,

iii) $z=\sqrt{a}x+ay^2+c$, iv) $z=ax^2+ay+c$.

j) For the partial differential equation $p^2+q^2=1$, the complete integral is — 02 — L_1 — CO6

i) $z=ax\pm(1/a)y+c$, ii) $z=ax\pm\sqrt{1-a^2}\,y+c$,

iii) $z=\sqrt{a}x+ay^2+c$, iv) $z=ax^2+ay+c$.

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EXM/P/09/01

Year and Program:2019-20	**School of Science**	**Department of Mathematics**
B.Sc.I	Section-B	
Course Code: MTS 102	**Course Title: Mathematics II**	**Semester – II**
Day and Date: Monday 13/1/20	**End Semester Examination (ESE)**	**Time:** 2.5hr [11am to 1.30pm
		Max Marks: 100

Instructions:
1) All questions are compulsory.
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks.

				Marks	Bloom's Level	CO
Q.2	a)		**Solve any two of the following.**			
		i)	Solve $\left(x^2-4xy-2y^2\right)dx-\left(y^2-4xy-2x^2\right)dy=0.$	04	L_2	CO1
		ii)	Solve $x^2y\,dx-\left(x^3+y^3\right)dy=0.$	04	L_2	CO1
		iii)	Solve $\left(1+x^2\right)\frac{dy}{dx}+2xy=\cos x.$	04	L_2	CO1
	b)		**Solve any two of the following.**			
		i)	Solve $\frac{d^2y}{dx^2}-5\frac{dy}{dx}+6y=e^{4x}.$	04	L_2	CO2
		ii)	Solve $\frac{d^3y}{dx^3}-y=\sin 2x.$	04	L_2	CO2
		iii)	Solve $\left(D^3-3D+2\right)y=x.$	04	L_2	CO2
Q3	a)		**Solve any two of the following.**			
		i)	Solve $\frac{dx}{mz-ny}=\frac{dy}{nx-lz}=\frac{dz}{ly-mx}.$	04 .	L_2	CO3
		ii)	Solve $\frac{dx}{y+z}=\frac{dy}{z+x}=\frac{dz}{x+y}.$	04	L_2	CO3
		iii)	Solve $\frac{dx}{x^2}=\frac{dy}{y^2}=\frac{dz}{z^2}.$	04	L_1	CO3
	b)		**Solve any two of the following.**			
		i)	Show that the equation $zdx+zdy+2\left(x+y+\sin z\right)dz=0$ satisfies the condition of integrability.	08	L_1	CO4
		ii)	Solve $zydx=zxdy+y^2dz$.	08	L_1	CO4
		iii)	Solve $z^2dx+\left(z^2-yz\right)dy+\left(2y^2-yz-xz\right)dz=0$.		L_2	CO4

			Marks	Level	CO
Q4		**Solve any two of the following.**			
	a)	If $z=f\left(x,y\right)$ is homogeneous function then show that $x\dfrac{\partial z}{\partial x}+y\dfrac{\partial z}{\partial y}=nz$.	08	L4	CO5
	b)	If $u=\log\left(x^2+y^2\right)$; then prove that $\dfrac{\partial^2 u}{\partial x\partial y}=\dfrac{\partial^2 u}{\partial y\partial x}$.	08	L3	CO5
	c)	If $x=e^u\cos v, y=e^u\sin v,$ then show that $JJ'=1$.	08	L4	CO5
Q5		**Solve any two of the following.**			
	a)	Solve $x^2p^2+y^2q^2=z^2$.	08	L3	CO6
	b)	Solve $p(1+q)=qz$.	08	L3	CO6
	c)	Solve $px-yq=y^2-x^2$.	08	L3	CO6
Q6		**Solve any two of the following.**			
	a)	If $u=\tan^{-1}\left(\dfrac{x+y}{\sqrt{x}+\sqrt{y}}\right)$; prove that $x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}=-\dfrac{1}{4}\sin 2u$.	08	L4	CO5
	b)	If $u=\dfrac{yz}{x},v=\dfrac{xz}{y}v,u=\dfrac{xy}{z}$, then find $\dfrac{\partial\left(u,v.w\right)}{\partial\left(x,y,z\right)}$.	08	L3	CO5
	c)	Solve $px+qy=pq$ by using Charpit's method.	08	L3	CO6
	d)	Solve $px+qy=z$ by using Lagrange's Method.	08	L3	CO6

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