NMAM INSTITUTE OF TECHNOLOGY, NITTE (An Autonomous Institution affiliated to VTU, Belgaum) II Sem B.E. (Credit System) Mid Semester Examinations – I, January 2015

14MA201 - ENGINEERING MATHEMATICS - II

Max. Marks: 20

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Note: Answer any One full question from each Unit.

Unit - I

a) Solve the differential equation $y e^{xy} dx + (xe^{xy} + 2y) dy = 0$

b) Solve the differential equation $y - 2px = \tan^{-1}(xp^2)$

- a) Write the order and the degree of the differential equation $\frac{\left[1+\left(\frac{z}{dx}\right)\right]}{\frac{d^2y}{dx^2}}=c$
- b) The law for the decay of radioactive materials states that disintegration at any instant is directly proportional to the amount of material present. If 30% of the radio active substance disappeared in 10 days, find how long will it take for 90% of it to disappear.
- a) If $L\{f(t)\} = \bar{f}(s)$, prove that $L\{\int_{0}^{t} f(u)du\} = \frac{1}{s}\bar{f}(s)$
- b) Find the general and singular solutions of the differential equation $\sin(v-px)=p$

a) If f(t) is a periodic function with period T, prove that

$$L[f(t)] = \frac{1}{1 - e^{-sT}} \int_{0}^{T} e^{-st} f(t) dt.$$

b) Find the Laplace transform of $t^2 \sin t$

ration: 1 Hour

NMAM INSTITUTE OF TECHNOLOGY, NITTE

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IJSem B.E. (Credit System) Mid Semester Examinations - I, January 2015

14MA201 - ENGINEERING MATHEMATICS - II

Max. Marks; 20

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Note: Answer any One full question from each Unit.

Solve the differential equation
$$y e^{xy} dx + (xe^{xy} + 2y) dy = 0$$

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b) Solve the differential equation
$$y - 2px = \tan^{-1}(xp^2)$$

Write the order and the degree of the differential equation
$$\frac{\left[1+\left(\frac{dy}{dx}\right)^2\right]^{3/2}}{\frac{d^2y}{dx^2}}=c$$

The law for the decay of radioactive materials states that disintegration at any instant is directly proportional to the amount of material present. If 30% of the radio active substance disappeared in 10 days, find how long will it take for 90% of it to disappear.

a) If
$$L\{f(t)\} = \bar{f}(s)$$
, prove that $L\{\int_{0}^{t} f(u)du\} = \frac{1}{s}\bar{f}(s)$

Find the general and singular solutions of the differential equation $\sin(y - px) = p$

If f(t) is a periodic function with period T, prove that

$$L[f(t)] = \frac{1}{1 - e^{-sT}} \int_{0}^{T} e^{-st} f(t) dt$$

Find the Laplace transform of $t^2 \sin t$

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in II	NMAM INSTITUTE OF TECHNOLOGY, NITTE (An Autonomous Institution affiliated to VTU, Belgaum) Sem B.E. (Credit System) Mid Semester Examinations – 1, January 2015	
	14MA201 - ENGINEEDING MATHEMATICS II	
Duration:	May Marks: 20	
	Note: Answer any One full question from each Unit.	
	Unit - 1	
1. a)	Solve the differential equation $y e^{xy} dx + (xe^{xy} + 2y) dy = 0$	5
b)	Solve the differential equation $y - 2px = \tan^{-1}(xp^2)$	5
	$\Gamma \sim (1)^{2}$	
	Write the order and the degree of the differential equation $\frac{\left[1+\left(\frac{dy}{dx}\right)^2\right]^{72}}{d^2y}=c$	
2. a)	Write the order and the degree of the differential equation $\frac{d^2y}{d^2y}$	
	$\frac{1}{dx^2}$	2
b)	The law for the decay of radioactive materials states that disintegration at any instant is directly proportional to the amount of material present. If 30% of the radio active substance disappeared in 10 days, find how long will it take for 90% of it to disappear.	8
	Unit – II	
	If $L\{f(t)\}=\bar{f}(s)$, prove that $L\{\int_{0}^{t}f(u)du\}=\frac{1}{s}\bar{f}(s)$	
3. a)	If $L\{f(t)\} = f(S)$, prove that $\begin{cases} J^{S} \\ 0 \end{cases}$	5
b)	Find the general and singular solutions of the differential equation $\sin(y - px) = p$	5
4. a)	If $f(t)$ is a periodic function with period T, prove that	
•	$L[f(t)] = \frac{1}{1 - e^{-sT}} \int_{0}^{T} e^{-st} f(t) dt$	6
b)	Find the Laplace transform of $t^2 \sin t$	4
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ration	14MA201 - ENGINEERING MATHEMATICS - II	
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	Note: Answer any One full question from each Unit. Max. Marks: 2.	
a)	Define the order and the design Unit - I	
b)	A body which is originally at $80^{\circ}C$ cools down to $60^{\circ}C$ in 20 minutes, the temperature of air being $40^{\circ}C$. Find the temperature of the body after 40 minutes from the residue.	2
	air being 40°C. Find the temperature of	•-
	air being $40^{\circ}C$. Find the temperature of the body after 40 minutes from the original.	S
a)	Solve the differential equation $\frac{dy}{dx} + \frac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$.	0
With.	$\frac{dr}{dr} + \frac{y \cos x + \sin y + y}{\sin x + \sin y} = 0$	
b)	Solve the differential and $x = x \cos y + x$	5
	Solve the differential equation $p(p+y) = x(x+y)$	J
		5
a)	Unit – II If $f(t)$ is a periodic function with period T, prove that	
	" J C y is a periodic function with period T, prove that	
	$L[f(t)] = \frac{1}{1 - e^{-sT}} \int_{0}^{T} e^{-st} f(t) dt$	
	$L[f(t)] = \frac{1}{1 - sT} \left[e^{-st} f(t) dt \right]$	
	$1-e^{-a}$	
	$\boldsymbol{\iota}$	6
b)	$\int e^{3t} \cos t dt$	
97	Find the Laplace transform of $\int_{0}^{t} e^{3t} \cos t dt$	
	0	
		4
	80	
۵۱	$\{f(t)\}$	
a)	If $L(f(t)) = f(s)$ then prove that $L(\frac{f(t)}{s}) = f(s) ds$	
	If $L\{f(t)\}=\bar{f}(s)$, then prove that $L\{\frac{f(t)}{t}\}=\int\limits_{s}^{\infty}\bar{f}(s)\ ds$	
b)		5
	Find the general and singular solutions of $y = xp - \log p$	J
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(An Autonomous Institution affiliated to VTU, Belgaum)

H Sem B.E. (Credit System) Mid Semester Examinations - 1, January 2015

14MA201 - ENGINEERING MATHEMATICS - II

Duration: 1 Hour

Max. Marks: 20

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Note: Answer any One full question from each Unit.

Unit - I

- a) Solve the differential equation $y e^{xy} dx + (xe^{xy} + 2y) dy = 0$
 - Solve the differential equation $y-2px= an^{-1}(xp^2)$
- 2. a) Write the order and the degree of the differential equation $\frac{\left[\frac{1}{x}\left(dx\right)\right]}{\frac{d^{2}y}{dx^{2}}}=c$
 - b) The law for the decay of radioactive materials states that disintegration at any instant is directly proportional to the amount of material present. If 30% of the radio active substance disappeared in 10 days, find how long will it take for 90% of it to disappear.
 - Unit II $L\left\{ \int_{0}^{t} f(u) du \right\} = \frac{1}{s} \bar{f}(s)$ prove that $L\left\{ \int_{0}^{t} f(u) du \right\} = \frac{1}{s} \bar{f}(s)$
 - b) Find the general and singular solutions of the differential equation $\sin(y px) = p$
- 4. a) If f(t) is a periodic function with period T, prove that
 - $L[f(t)] = \frac{1}{1-e^{-sT}} \int_{0}^{T} e^{-st} f(t) dt.$
 - b) Find the Laplace transform of $t^2 \sin t$

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

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II Sem B.E. (Credit System) Mid Semester Examinations - II, March 2015

14MA201 - ENGINEERING MATHEMATICS - II

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Max. Marks: 20

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Note: Answer any One full question from each Unit.

Unit - I

a) Rewrite the following function using unit step function and hence find its Laplace transform

$$f(t) = \begin{cases} t^2, & 0 < t < 2 \\ 4, & 2 < t < 4 \\ 0, & t > 4 \end{cases}$$

 $L^{-1} \left\{ \frac{s e^{-s/2} + \pi e^{-s}}{s^2 + \pi^2} \right\}$

a) Find $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$ using convolution theorem.

b) Solve the differential equation $x''(t) + x(t) = 6\cos 2t$; x(0) = 3, x'(0) = 1 using Laplace transform method.

Unit - II

- 3. a) A spring is such that 1.96kg weight stretches it 19.6cms an impressed force $\frac{1}{2}\cos 8t$ is acting on the spring. If the weight is started from the equilibrium point with an imparted upward velocity of 14.7 cms. per sec. , determine the position of the weight as a function of time.
 - b) Solve the differential equation $(D^2 + D 2)y = x + \sin x$ using the method of undetermined coefficients.
 - a) Solve the differential equation $x \frac{d^2y}{dx^2} \frac{2y}{x} = x + \frac{1}{x^2}$.
 - b) Solve $(D^2 4D + 3)y = \sin 3x \cos 2x$