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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

Duration: 1 Hour Max. Marks: 20

Note: Answer any **One** *full question from* **each Unit.**

Unit – I

a) Solve the differential equation $ye^{xy}dx + \left(xe^{xy} + 2y\right)dy = 0$ 5

b) Solve the differential equation $y - 2px = \tan^{-1}\left(xp^2\right)$ 5

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

a) If $L\{f(t)\} = \bar{f}(s)$, prove that $L\left\{\int_0^t f(u)du\right\} = \dfrac{1}{s}\bar{f}(s)$ 5

b) Find the general and singular solutions of the differential equation $\sin(y - px) = p$ 5

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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ections: H-N

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Unit – I

a) Solve the differential equation $y e^{xy} dx + \left(x e^{xy} + 2y\right) dy = 0$ 5

b) Solve the differential equation $y - 2px = \tan^{-1}\left(xp^2\right)$ 5

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

3\. a) If $L\{f(t)\} = \bar{f}(s)$, prove that $L\left\{\int_0^t f(u)du\right\} = \frac{1}{s}\bar{f}(s)$ 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

$$L[f(t)] = \frac{1}{1-e^{-sT}} \int_0^T e^{-st} f(t)dt.$$

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

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Sections: H-N

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Unit – I

1. a) Solve the differential equation $ye^{xy}dx + \left(xe^{xy} + 2y\right)dy = 0$ — 5

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

3. a) If $L\{f(t)\} = \bar{f}(s)$, prove that $L\left\{\int_0^t f(u)du\right\} = \frac{1}{s}\bar{f}(s)$ — 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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Sections: A-G

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II Sem B.E. (Credit System) Mid Semester Examinations – I, January 2015

14MA201 - ENGINEERING MATHEMATICS - II

Duration: 1 Hour

Max. Marks: 20

*Note: Answer any **One** full question from **each Unit.***

Unit – I

1\. a) Define the order and the degree of a differential equation. 2

b) A body which is originally at $80^0 C$ cools down to $60^0 C$ in 20 minutes, the temperature of air being $40^0 C$. Find the temperature of the body after 40 minutes from the original. 8

2\. a) Solve the differential equation $\frac{dy}{dx}+\frac{y\cos x+\sin y+y}{\sin x+x\cos y+x}=0$. 5

b) Solve the differential equation $p(p+y)=x(x+y)$ 5

Unit – II

3\. 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 $\int_0^t e^{3t}\cos t\, dt$ 4

4\. a) If $L\{f(t)\}=\bar{f}(s)$, then prove that $L\left\{\frac{f(t)}{t}\right\}=\int_s^\infty \bar{f}(s)\,ds$ 5

b) Find the general and singular solutions of $y=xp-\log p$ 5

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Sections: II-N

C

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14MA201 - ENGINEERING MATHEMATICS - II

Duration: 1 Hour

Max. Marks: 20

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Unit – I

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Unit – II

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

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Sections: A-G

A C

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

14MA201 - ENGINEERING MATHEMATICS - II

Duration: 1 Hour

Max. Marks: 20

Note: Answer any **One** *full question from* **each Unit.**

Unit – I

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

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

5

b) Find $L^{-1}\left\{\dfrac{s\,e^{-s/2}+\pi\,e^{-s}}{s^2+\pi^2}\right\}$. 5

2\. a) Find $L^{-1}\left\{\dfrac{s}{(s^2+a^2)^2}\right\}$ using convolution theorem. 5

b) Solve the differential equation $x''(t)+x(t)=6\cos 2t\ ; x(0)=3,\ \ x'(0)=1$ using Laplace transform method. 5

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. 5

b) Solve the differential equation $(D^2+D-2)y=x+\sin x$ using the method of undetermined coefficients. 5

4\. a) Solve the differential equation $x\dfrac{d^2y}{dx^2}-\dfrac{2y}{x}=x+\dfrac{1}{x^2}$. 5

b) Solve $(D^2-4D+3)y=\sin 3x\cos 2x$ 5

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