b) Evaluate $\int_0^1\int_0^2\int_1^2 x^2 yz\, dxdydz$.

c) Find the volume common to the cylinders $x^2+y^2=a^2$ and $x^2+z^2=a^2$ using double integrals.

Unit – IV

7. a) If f(t) is a periodic function with period T so that f(t+ T)= f(t) for all values of t prove that $L(f(t)) = \dfrac{1}{1-e^{-sT}}\int_0^T e^{-st} f(t)dt$.

b) Solve $x''(t)+4x'(t)+4x(t)=4e^{-2t}$; $x(0)=-1$ $x'(0)=4$ by the Laplace transform method.

c) Find Laplace transform of (i) $e^{-3t}(2\cos 5t-3\sin 5t)$ (ii) $\dfrac{\cos at-\cos bt}{t}$

8. a) Using partial fractions obtain inverse Laplace transform of (i) $\dfrac{s^2+s-2}{s(s+3)(s-2)}$

(ii) Find $L^{-1}\{\dfrac{15}{s^2+4s+13}\}$.

b) Rewrite the following functionusing unit step function and find its Laplace transform, f(t)= $\begin{cases} t^2 & 0<t\le 3 \\ 4t & t>3 \end{cases}$.

c) Find the inverse Laplace transform of $\dfrac{1}{(s^2+1)(s+1)}$ using convolution theorem.

Unit – V

9. a) Formulate a partial differential equation of $Z=yf(x)+xg(y)$

b) Determine the solution of $(x^2-y^2-z^2)p+2xyq=2xz$ by Lagrange's method.

c) Using the method of separation of variables solve $\dfrac{\partial u}{\partial x}=4\dfrac{\partial u}{\partial y}$ given $u(0,y)=8e^{-3y}+4e^{-5y}$

10. a) Solve $\dfrac{\partial^2 z}{\partial x^2}+z=0$ given that when x=0, z = e^y and $\dfrac{\partial z}{\partial x}=1$.

b) Apply the method of separation of variables to determine the solution of $x^2\dfrac{\partial u}{\partial x}+y^2\dfrac{\partial u}{\partial y}=0$

c) Derive one dimensional wave equation in the form $\dfrac{\partial^2 y}{\partial^2 t}=c^2\dfrac{\partial^2 y}{\partial x^2}$

BT* Bloom's Taxonomy, L* Level

****

NMAM

(An Au

Second Sem

Mak

tion: 3 Hours

Note: Answer Fiv

a) Solve $p(p+y)=x$

b) Solve (xy^2-e^{y/x^3})

c) When a resistance

e.m.f E volts, th

$E=10\sin t$ volts

a) Solve $y=-px+$

b) Show that the sys

c) Solve $(5x^4+6x$

a) Solve the differen

b) Solve the differen

c) A spring is such be attached to t weight is started damping or impr

a) Solve the differe

b) Solve the differe

c) Solve $(D^2-2$

a) Change the ord

b) Evaluate $\int_0^a\int_0^x\int_0$

c) Using double in

USN

NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester B.E. (Credit System) Degree Examinations

April - May 2016

15MA201 – ENGINEERING MATHEMATICS - II

Duration: 3 Hours   Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit**.*

Q. No.		Question	Marks	BT*
		Unit – I		
1.	a)	Show that the differential equation $(ycosx+siny+y)dx+(sinx+xcosy+x)dy=0$ is exact. Hence find its solution.	6	L3
	b)	Obtain the orthogonal trajectories of the family of curves $r^n = a\sin n\theta$.	7	L5
	c)	Find the general and singular solutions of $p=\log(px-y)$	7	L2
2.	a)	Solve $xp^2+x=2yp$.	6	L3
	b)	When a resistance R ohms is connected in series with an inductance L henries with an e.m.f E volts, the current i amperes at time t is given by $L\frac{di}{dt}+Ri=E$. If $E=10\sin t$ volts and $i=0$, when $t=0$, find i as a function of t.	7	L2
	c)	Solve $y(x+y+1)dx+x(x+3y+2)dy=0$.	7	L3
		Unit – II		
3.	a)	Solve $(D^2-4D+3)\,y = \sin 5x$	6	L3
	b)	Solve $(D^2+5D+6)\,y = e^{-2x}\sin 2x$	7	L3
	c)	Solve $(D^2+4)\,y = \tan 2x$ using the method of variation of parameters.	7	L4
4.	a)	Solve $(D^2+2D+2)\,y = 1+3x+x^2$	6	L3
	b)	Solve $(D^2-D-2)\,y = 36xe^{2x}$	7	L3
	c)	Solve $(D^2+2D+4)\,y = 2x^2+3e^{-x}$ by the method of undetermined multipliers.	7	L4
		Unit – III		
5.	a)	Prove that $\beta(m,n)=\frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$.	7	L4
	b)	Prove that $\int_0^{\pi/2}\sqrt{\sin\theta}\,d\theta \cdot \int_0^{\pi/2}\frac{d\theta}{\sqrt{\sin\theta}}=\pi$.	6	L3
	c)	Evaluate $\int_0^1 x^7(1-x^4)^3\,dx$ in terms of gamma function	7	L3
6.	a)	Evaluate $\int_0^1\int_0^{\sqrt{1-x^2}} y^2\,dydx$ by changing the order of integration.	7	L3

P.T.O.

b) Evaluate $\int_0^\infty \int_0^x x e^{-\left(\frac{x^2}{y}\right)} dy dx$ by changing the order of integration.

c) Find the volume bounded by the xy plane, the cylinder $x^2+y^2=1$ and the plane $x+y+z=3$.

Unit – IV

7. a) Find Laplace transform of (i) $4\sin^2 2t+5\cos 4t$

(ii) $\int_0^t e^{-t}\cos t\,dt$

b) If f(t) is a periodic function with period T so that f(t+ T) = f(t) for all values of t, prove that $L(f(t))=\dfrac{1}{1-e^{-sT}}\int_0^T e^{-st}f(t)\,dt$.

c) Find the inverse Laplace transform of $\dfrac{1}{(s^2+1)(s+1)}$ using convolution theorem.

8. a) Rewrite f(t)= $\begin{cases} \sin t & 0<t\le \dfrac{\pi}{2} \\ \cos t & t>\dfrac{\pi}{2} \end{cases}$ using unit step function and find its Laplace transform.

b) Using partial fractions obtain inverse Laplace transform of $\dfrac{2s+3}{(s-1)(s+2)^3}$.

c) A voltage $E=E_0e^{-at}$ where E_0 and a are constants, is applied at time t=0 to an LR circuit of inductance L and resistance R. Find the current at time t>0.

Unit – V

9. a) Formulate a partial differential equation by eliminating the function F from the equation

$$F\left(x^2+y^2, z-xy\right)=0$$

b) Determine the solution of $\left(x^2-yz\right)p+\left(y^2-zx\right)q=z^2-xy$ by Lagrange's method.

c) Solve $\dfrac{\partial^2 z}{\partial x^2}=a^2 z$ given that when $x=0$, $\dfrac{\partial z}{\partial x}=a\sin y$ and $\dfrac{\partial z}{\partial y}=0$

10. a) Solve $\dfrac{\partial^3 z}{\partial x^2 \partial y}+18xy^2+\sin(2x-y)=0$

b) Apply the method of separation of variables and hence determine the solution of $2x\dfrac{\partial z}{\partial x}-3y\dfrac{\partial z}{\partial y}=0$

c) Derive one dimensional heat flow equation in the form $\dfrac{\partial u}{\partial t}=c^2\dfrac{\partial^2 u}{\partial x^2}$

BT* Bloom's Taxonomy, L* Level

****

USN

NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester B.E. (Credit System) Degree Examinations

Make up / Supplementary Examinations – July 2016

15MA201 – ENGINEERING MATHEMATICS - II

Duration: 3 Hours | Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit**.*

		Marks	BT*
	Unit – I		
a)	Show that the differential equation $(y^3-3x^2y)dx-(x^3-3xy^2)dy=0$ is exact. Hence find its solution.	6	L*3
b)	Find the orthogonal trajectories of family $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2+\lambda}=1$ where λ is a parameter.	7	L2
c)	Find the general and singular solutions of $y=xp+\dfrac{a}{p}$.	7	L2
a)	Solve $\left(x\dfrac{dy}{dx}\right)^2+xy\dfrac{dy}{dx}-6y^2=0$.	6	L3
b)	If a body originally is at 80^0C cools down to 60^0C in 20 minutes. The temperature of air being 40^0C. Find the temperature of the body after 40 minutes from the original.	7	L2
c)	Solve $[xy\sin(xy)+\cos(xy)]ydx+[xy\sin(xy)-\cos(xy)]xdy=0$.	7	L3
	Unit – II		
a)	Solve $(D^3-6D^2+11D-6)\ y=e^{-2x}+e^{-3x}$	6	L3
b)	Solve $(D^3+D^2+D+1)\ y=\cos 2x$	7	L3
c)	Solve $(D^2-4D+4)\ y=(e^{2x}/x)$ using the method of variation of parameters.	7	L4
a)	Solve $(D^2-4D+3)\ y=\sin x$	6	L3
b)	Solve $x^2(d^2y/dx^2)-2x(dy/dx)-4y=x^2+2\log x$	7	L3
c)	A spring is such that 1.96 kg weight streches it 19.6 cms, an impressed force (1/2) cos 8t is acting on the spring. If the weight is started from equilibrium point with an imparted upward velocity of 14.7 cm/s then determine the position of the weight as a function of time.	7	L4
	Unit – III		
a)	Evaluate $\displaystyle\int_0^1 \frac{x^\alpha-1\,dx}{\log x}$ $\alpha\geq 0$ using differentiation under the integral sign.	6	L3
b)	Prove that $\beta(m,n)=\dfrac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$.	7	L4
c)	Evaluate i) $\displaystyle\int_o^\infty x^4e^{-x^2}\,dx$ ii) $\displaystyle\int_o^\infty x^6e^{-2x}\,dx$	7	L3
5. a)	Evaluate $\displaystyle\int_0^a\int_0^x\int_0^{x+y} e^{x+y+z}\,dzdydx$.	6	L3

P.T.O.