# B.TECH. SEM -II (2007 COURSE) (ALL BRANCHES) :
# WINTER - 2017
## SUBJECT : ENGINEERING MATHEMATICS – II

**Day:** Monday
**Date:** 20/11/2017

**W-2017-2347**

**Time:** 10.00 AM TO 01.00 PM
**Max. Marks:** 80

**N.B:**

1) **Q. No 1** and **Q. No.5 are COMPULSORY.** Out of remaining questions attempt **ANY TWO** questions from each section.
2) Answer to both the sections should be written in the **SEPARATE** answer books.
3) Use of non programmable **CALCULATOR** is allowed.
4) Figures to right indicate **FULL** marks.
5) Assume suitable data if necessary.

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## SECTION –I

**Q.1** **a)** Find the spherical polar co-ordinates of $(-2,-1,-3)$ **(04)**

**b)** The acceleration if a moving particle being proportional to the cube of its velocity and negative , show that the distance passed over in time is given by equation $s=\frac{\sqrt{2kv_0^2t+1}-1}{kv_0}$ ,the initial velocity being $v_0$, and the distance being measured from the position of the particle at time $t=0$ **(06)**

**c)** Form the differential equation whose general solution is $y=A\cos nx+B\sin nx$ **(04)**

**Q.2** Solve **ANY THREE** of the following: **(13)**

**a)** $\frac{dy}{dx}=1-x(y-x)-x^3(y-x)^2$

**b)** $\frac{dy}{dx}=\frac{2x-3y+1}{3x+4y-5}$

**c)** $(x^2y+y^4)\,dx+(2x^3+4xy^3)\,dy=0$

**d)** $(y^2x-e^{1/x^3})\,dx-yx^2\,dy=0$

**Q.3** **a)** The equation of an L-R circuit is given by $L\frac{dI}{dt}+RI=E.$ **(05)**
Given that $L=640\,H, R=250\,ohms$ and $E=500\,volts.$
$I$ being zero when $t=0.$
Find the time that elapses, before it reaches 90% of its maximum value.

**b)** A body at temperature of $100^0c$ is placed in a room whose temperature is $30^0c$ and cools to $70^0c$ in 5 minutes. Find its temperature after a further interval of 3 minutes. **(04)**

**c)** A pipe 40 cm in diameter contains steam at $160^0c$ and is protected with a covering 7cm thick. If the temperature of the outer surface of the covering is $50^0c$. Find the temperature half-way through the covering under steady state conditions. **(04)**

**P.T.O.**

**Q.4** **a)** Find the equation of the sphere inscribed in the tetrahedron having faces $x+y=0,\ y+z=0,\ z+x=0$ and $x+y+z=1$ **(05)**

**b)** Find the equation of the cone with vertex (5,4,3) and with $3x^2+2y^2=6, y+z=0$ as base **(04)**

**c)** Find the equation of the right circular cylinder of radius 2 whose axis passes through (1,2,3) and has direction cosines proportional to 2, -3, 6. **(04)**

## SECTION -II

**Q.5** **a)** solve $\int_0^1 \int_0^{\sqrt{1-x^2}} \frac{dydx}{(1+e^y)\sqrt{1-x^2-y^2}}$ **(05)**

**b)** Trace the curve $x(y^2+x^2)=a\,(x^2-y^2)$ where $a>0$ **(04)**

**c)** Find the fourier series expansion for periodic function $f(x), if$ **(05)**

$$f(x)=\begin{cases}-\pi & -\pi<x<0\\ x & 0<x<\pi\end{cases}$$

**Q.6** **a)** Evaluate $\int_0^1 \frac{(x-2x^2+x^3)\,dx}{(1+x)^5}$ **(04)**

**b)** Evaluate $\int_0^\infty x^{n-1}e^{-ax}\cos bx\ dx$ **(04)**

**c)** Find the fourier half range cosine series for $\cos x$ in $0<x<\pi$ **(05)**

**Q.7** **a)** Trace the curve $r=a\sin 3\theta$ **(04)**

**b)** Evaluate $\int_0^\infty e^{-x^2-2bx}\ dx=\sqrt{\pi}\,\frac{e^{b^2}}{2}[1-erf(b)]$ **(04)**

**c)** Evaluate $\int_0^\infty e^{-bx^2}\cos(2ax)\,dx\ ;(b>0)$ **(05)**

**Q.8** **a)** Find the area between the curve $y^2=4x$ and $2x-3y+4=0$ **(04)**

**b)** Find the volume bounded by the cylinders $y^2=x,\ x^2=y$ and the planes $z=0, x+y+z=2$ **(04)**

**c)** Evaluate $\iiint(x^2y^2+y^2z^2+z^2x^2)dx\,dy\,dz$ throughout the volume of the sphere $y^2+x^2+z^2=a^2$ **(05)**

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