Total No. of Questions – [5] Total No. of Printed Pages 3

G.R. No.	

U118 – 109 (BE-FF)

(BACKLOG EXAM)

( ) DEC 2018/~~END SEMESTER EXAM~~

F. Y. B. TECH. (COMMON) (SEMESTER - II)

COURSE NAME:ENGINEERING MATHEMATICS II

COURSE CODE:ES12171

(2017 PATTERN)

Time: [**2 Hours**] [Max. Marks: **50**]

(*) Instructions to candidates:

1) **Answer Q.1 OR Q.2, Q.3 OR Q.4 and Q.5**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data whereever required**

Q.1) a) Find the equation of the sphere which passes through the point (-1,0,0) and touches the plane $2x - y - 2z - 4 = 0$ at the point $(1,2,-2)$. **[6]**

b) Find the equation of the right circular cone with vertex at $(1, 2, -3)$ semi vertical angle $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$ and the line $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z+1}{-1}$ as axis. **[6]**

c) Find the equation of the right circular cylinder whose axis is $x = 2y = -z$ and radius is 4. **[4]**

OR

Q.2) a) Find the equation of the sphere passing through the circle $x^2 + y^2 + z^2 = 9$; $2x + 3y + 4z = 5$ and the point $(1,2,3)$. **[6]**

b) Find the equation of the right circular cone which passes through the point $(1, 1,2)$ and has its axis the line $6x = -3y = 4z$ and vertex at origin. **[6]**

c) Find the equation of right circular cylinder of radius 2 whose axis passes through $(1, 2, 3)$ and has direction cosines proportional to 2, -3, and 6. **[4]**

Q.3) a) Evaluate: $\int_0^1 \int_0^{\sqrt{1-x^2}} \frac{dx\,dy}{(1+e^y)\sqrt{1-x^2-y^2}}$ **[6]**

b) Evaluate: $\iint x^2y^2\,dxdy$ over the region R which is the positive quadrant of $x^2+y^2=1$ **[4]**

c) Find the volume of the region enclosed by the cone $z=\sqrt{x^2+y^2}$ and paraboloid $z=x^2+y^2$. **[4]**

OR

Q.4) a) $\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \frac{dxdy}{(1+x^2+y^2)\sqrt{1+x^2+y^2}}$ **[6]**

b) $\iiint_V (x^2+y^2)\,dx\,dy\,dz$, where V is $x^2+y^2=2z$ and $z=2$. **[4]**

c) Find the total area of the curve $r=a(1+\cos\theta)$. **[4]**

Q.5) Attempt the following :[2 marks each] **[20]**

a) Find the differential equation whose general solution is $y=c^2+\frac{C}{x}$, *where c* is arbitrary constant .

b) Find the differential equation whose general solution is $y=A\cos x)+B\sin x$, where A & B are arbitrary constants.

c) Find the integrating factor of the differential equation $\frac{dy}{dx}+\frac{y}{x^2}=x^2$.

d) Find the differential equation of orthogonal trajectories of family of curves $2x^2-y^2=cx$ *where c* is arbitrary constant .

e) The temperature of the air is 20 ℃ and the substance cools from 100 ℃ to 80 ℃ in 15 minutes. If differential equation by Newton's law of cooling is $\frac{d\theta}{dt}=-k(\theta-20)$, then find the value of k.

f) Find the value of $\int_0^{\infty} e^{-4x}x^4\,dx$

g) For the certain data if $a_0 = 2,\ a_1 = 0.5,\ b_1 = 1.5$ then find the amplitude of 1st harmonic.

h) If $I(a) = \int_0^{a^2} \sin^{-1}\left(\frac{x}{a}\right) dx$, then find $\frac{dI}{da}$.

i)Find the value of $\frac{d}{dx}\text{erf}(x)$.

j) Choose the correct option for the following:

1)A double point is Node if,

a)Two branches have distinct tangents

b)Tangent line cuts the curve unusually.

c)Two branches have a common tangent

d)None of the above

2) The parametric curve $x = f(t), y = g(t)$ is symmetric about y –axis if,

a)f(t) is even and g(t) is an odd function of t

b)Both f(t) and g(t) are odd functions of t

c)f(t) is an odd and g(t) is even function of t

d)Both f(t) and g(t) are even functions of t