



Register Number:.....

**B.E / B.TECH DEGREE EXAMINATIONS: JUNE 2015**

(Regulation 2013)

Second Semester

**U13MAT201 : ENGINEERING MATHEMATICS II**

(Common to all branches)

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

- The value of  $\int_0^1 \int_0^2 \int_0^3 xyz \, dx \, dy \, dz$  is \_\_\_\_\_
- Area assumed in the integral  $\int_0^3 \int_0^2 (4 - y^2) \, dy \, dx$  is a
  - rectangle
  - $\int_0^{\infty} \int_0^{-x} f(x, y) \, dx \, dy$
  - $\int_0^{\infty} \int_x^{\infty} f(x, y) \, dx \, dy$
  - $\int_0^{\infty} \int_{-x}^{\infty} f(x, y) \, dx \, dy$
- If  $\vec{r}$  is the position vector of a point in the xyz plane, then  $\text{curl } \vec{r}$  is equal to \_\_\_\_\_
- Stokes theorem converts
  - Line integral into surface integral
  - Surface integral to volume integral
  - Line integral to volume integral
  - None
- Cauchy Riemann equation in Polar coordinate is
  - $u_r = v_\theta/r$  &  $v_r = u_\theta/r$
  - $u_r = v_\theta/r$  &  $v_r = -u_\theta/r$
  - $u_r = v_\theta/r$  &  $v_r = u_\theta/r$
  - $u_r = -v_\theta/r$  &  $v_r = u_\theta/r$
- The transformation  $w = 1/z$  is known as \_\_\_\_\_
- If the Laurent's series of  $f(z)$  contains an infinite number of negative powers of  $(z-a)$  then  $z = a$  is called as \_\_\_\_\_
- The value of  $\int_c \frac{z}{z^2 - 1} dz$  where  $c$  is the circle  $|z| = 1/4$  is \_\_\_\_\_



b) (i) Express  $\int_0^a \int_y^a \frac{x^2 dx dy}{(x^2 + y^2)^{\frac{3}{2}}}$  in polar coordinates and then evaluate it. (7)

(ii) Evaluate  $\iiint_V (x+y+z) dx dy dz$ , where V is the region of space inside the cylinder  $x^2 + y^2 = a^2$  that is bounded by the planes  $z = 0$  and  $z = h$ . (7)

23. a) (i) If  $f(z)$  is an analytic function of  $z$ , Prove that  $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |f(z)|^2 = 4|f'(z)|^2$ . (7)

(ii) Find the bilinear transformation that maps the points  $(1+i, -i, 2-i)$  in the  $z$ -plane onto the points  $(0, 1, i)$  in the  $w$ -plane (7)

(OR)

b) (i) Construct an analytic function  $w = u + iv$  if  $v = e^{2x}(x \cos 2y - y \sin 2y)$ . (7)

(ii) Find the image of the circle  $|z|=2$  by the transformation  $w = z + 3 + 2i$ . (7)

24. a) (i) Evaluate  $\int_C \frac{z dz}{(z-1)(z-2)^2}$  where C is  $|z-2| = 1/2$  using Cauchy's integral formula. (7)

(ii) Using Cauchy's Residue theorem, Evaluate  $\int_C \frac{\cos \pi z^2 + \sin \pi z^2}{(z+1)(z+2)} dz$  where C is  $|z| = 3$  (7)

(OR)

b) (i) Expand  $f(z) = \frac{1}{z(1-z)}$  in Laurent's series valid for  $|z+1| < 1$ . (7)

(ii) Evaluate  $\int_0^{2\pi} \frac{\cos 3\theta}{5 + 4 \cos \theta} d\theta$ , using Contour integration. (7)

25. a) (i) Find the Laplace transform of the square wave function  $f(t) = \begin{cases} k, & 0 \leq t \leq a \\ -k, & a \leq t \leq 2a \end{cases}$  given  $f(t+2a) = f(t)$ . (7)

(ii) Using Convolution theorem, find  $L^{-1}\left(\frac{1}{(s+1)(s+2)}\right)$ . (7)

(OR)

b) Using Laplace transform, Solve  $y'' + y' - 2y = 3 \cos t - 11 \sin 3t$ ,  $y(0) = 0$  and  $y'(0) = 6$ .

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