MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

II SEM - Engg. Mathematics II
MAT -1251 (II sessional)

Time: 1 Hr. **Date: 23.03.2019** **Time: 12.00PM-1.00PM** **Max. Marks: 15**

Answer **ALL** the questions

Note: Questions 1 to 10 are of 0.5 mark and 11 to 15 are of 2 marks each

---

1. The value of $L\{\frac{1-e^t}{t}\}$ is _____

   $a)\ \log(\frac{s-1}{s})$ $b)\ \log(\frac{s}{s-1})$

   $c)\ \log(\frac{s-1}{s+1})$ $d)\ \log(\frac{s+1}{s-1})$

2. The area between the curves $y = x$ and $y = x^2$ is _____

   $a)\ {}^1/_2$ b) ${}^3/_4$ $c)\ {}^1/_4$ $d)\ {}^1/_6$

3. The value of $\int_0^\infty \frac{x^{12}}{(1+x)^{15}}dx$= _____

   $a)\ \beta(13,2)$ $b)\ \beta(12,15)$

   $c)\ \beta(3,12)$ $d)\ \beta(11,2)$

4. For spherical polar coordinates the value of $J\left(\frac{x,y,z}{r,\theta,\varphi}\right)$ is ____

   $a)\ r\sin\theta$ $b)\ r\cos\theta$ $c)\ r^2\sin\theta$ $d)\ r^2\cos\theta$

5. The value of $L(2^{3t})$ =_____

   $a)\ \frac{1}{s-3}$ $b)\ \frac{1}{s-ln8}$

   $c)\ \frac{1}{s-ln6}$ $d)\ \frac{1}{s-ln9}$

6. The limits of θ when finding the area of the region inside $r = 1 + \cos\theta$ and outside the circle $r = 1$ is _____.

   $a) -\pi\ to\ \pi$ $b)\ 0\ to\ \pi$

   $c)\ 0\ to\ 2\pi$ d) $-{}^\pi/_2\ to\ {}^\pi/_2$

7. If $u = s\cos t$ and $v = s\sin t$ then $\frac{\partial(s,t)}{\partial(u,v)}$ = _____.

   $a)\ s$ $b)\ \frac{1}{s}$ $c)\ t$ $d)\ \frac{1}{t}$

8. Write the given integral in polar form: $\iint_R \sqrt{x^2+y^2}\ dx\ dy$, where R is the region bounded by $x^2+y^2=a^2$ and $x^2+y^2=b^2$ where $a<b$.

$a)$ $\int_0^{\pi}\int_a^b r^2 dr\ d\theta$ $b)$ $\int_0^{2\pi}\int_a^b r^2 dr\ d\theta$

$c)$ $\int_0^{\pi}\int_a^b r\ dr\ d\theta$ $d)$ $\int_0^{2\pi}\int_a^b r\ dr\ d\theta$

9. The value of $\Gamma\left(\frac{1}{3}\right)\Gamma\left(\frac{2}{3}\right)$ is _____.

$a)$ $\frac{2\pi}{\sqrt{3}}$ $b)$ 2π $c)$ $\frac{\sqrt{3}\,\pi}{2}$ $d)$ $\frac{\pi}{\sqrt{2}}$

10. The limit of y in the projection of the tetrahedron $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}$=1 on XOY plane while finding the volume is _____

$a)$ 1 to $b(1-\frac{x}{a})$ $b)$ 0 to $a\left(1-\frac{x}{a}\right)$

$c)$ 0 to 1 $d)$ 0 to $b\left(1-\frac{x}{a}\right)$

11. Calculate the volume of a solid whose base is in a xy-plane and is bounded by the parabola $y = 4-x^2$ and the straight line $y = 3x$, while the top of the solid is in the plane $z = x + 4$.

12. Evaluate $\int_{-1}^{1}(1+x)^6(1-x)^7 dx$.

13. Find the Laplace transform of $t^2e^{-3t}sin2t$.

14. Find the volume of the portion of the sphere $x^2+y^2+z^2=a^2$ inside the cylinder $x^2+y^2=ay$.

15. Evaluate $\int_0^a\int_y^a \frac{x}{x^2+y^2}dxdy$ by changing to polar coordinates.