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SUBJECT CODE NO:- 2054
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. F.Y (Sem-II)
Mathematics MAT - 201
(Integral Calculas)

[Time: 1:53 Hours] **[Max. Marks:50]**

Please check whether you have got the right question paper.

N.B 1) Attempt all questions.
2) Figures to the right indicate full marks.

Q.1 A) Attempt any one 08

a) Obtain a reduction formula for $\int x^m \sin nx dx$

b) Evaluate the definite integral $\int_0^{\pi/2} \cos^n x \, dx$ where n is positive integer also find $\int_0^{\pi/4} \cos^6 2t \; dt$

B) Attempt any one 07

c) Evaluate $\int_0^1 \frac{dx}{x^2+2x\cos\propto+1}$ where $0 \leq \propto < \pi$

d) Evaluate $\int_0^\infty \frac{dx}{(1+x)^3(2+x)}$

Q.2 A) Attempt any one 08

a) Evaluate $\int_a^b \cos x \, dx$ the limit of a sum

b) Find the area bounded by the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

B) Attempt any one

c) Find the length of the are of the parabola $y^2 = 4ax$ cut off by its latus redtum. 07

d) Show that the volume obtained by revolving about x-axis the arc of the curve y=f(x) intercepted between the point whose abscissa are a,b is $\int_a^b \pi \, y^2 dx$ it being assumed that are does not cut x-axis.

Q.3 A) Attempt any one 05

a) Prove that the necessary and sufficient condition for a continuous vector point function for a irrotational in a simply connected region R is that it is the gradient of a scalar point function.

b) Prove that $\int_v (\overrightarrow{g}.curl\ curl\ \vec{f} - \vec{f}.curl\ curl\ \vec{g})dv = \int_s \{(\vec{f} \times curl\vec{g}) - (\vec{g} \times curl\ \overrightarrow{f})\}.d\vec{a}$

B) Attempt any one 05

c) Show that $^1/_3 \int_s \overrightarrow{r}.d\vec{a} = v$ where v is the volume enclosed by the surface's

d) Evaluate $\int_s \overrightarrow{F}.\ d\vec{r}$ where $\overrightarrow{F} = (x^2 + y^2)\bar{\imath} - 2xy\vec{j}$ and the curve C is the rectangle in the xy-plane bounded by y=0, x=a, y=b, x=0.

Q.4 Choose the correct alternatives 10

1) $\int \frac{2dx}{3-2x} = -$
   a) $\log(3-2x)$ b) $-\log(3-2x)$
   c) $^1/_2 \log(3-2x)$ d) $^{-1}/_2 \log(3-2x)$

2) $\int_0^{\pi/2} \sin^7 x\ dx$
   a) $^{16}/_{35}$ b) $^{15}/_{35}$
   c) $^{16}/_{40}$ d) $^{-16}/_{35}$

3) The length of the are of the cure y=log sec x from x-0 to $x = \pi/3$ is equal to
   a) 2log (2+$\sqrt{3}$) b) Log (2+$\sqrt{3}$) c) 3log2 d) Log (2-$\sqrt{3}$)

4) A vector point function is said to be ----------in a region if its circulation along every closed curve in the region is zero
   a) Polar b) Axial c) Irrotational d) Solenoidal

5) Value of $\iint_s \nabla r^2 . d\vec{s}$ is
   a) V b) 3V c) 6V d) 12V