University Roll No

First Mid Term Examination, Even Semester 2014-15 23/2/15

B.Tech. (I Year)- II Semester

Subject:- Mathematics-II Subject Code:- AHM-102

Time: 1 ½ Hours Max. Marks: 20

Section-A

Note: *Attempt All Questions* 1×5=5

1. Find the value of $\Gamma\frac{1}{4}\Gamma\frac{3}{4}$.
2. Write the statement of Liouville's extension of Dirichlet theorem.
3. Find the value of $\int_0^{\frac{\pi}{2}} \sin^2\theta \cos^4\theta d\theta$.
4. Change the order of integration $\int_0^a \int_{\sqrt{a^2-y^2}}^{y+a} f(x,y)dxdy$.
5. Test the convergence of $\int_{-\infty}^{0} e^{-x}dx$..

Section-B

Note: *Attempt Any hree Questions* 3×2=6

1. Let D be the region in the first quadrant bounded by the curves xy= 16, x=y, y=0 and x = 8. Sketch the region of integration of the following integral $\iint_D x^2 dxdy$ and hence evaluate.

2. Solve the differential equation $\int_0^1 y^{q-1}\left(\log\frac{1}{y}\right)^{p-1} dy = \frac{\Gamma p}{q^p}$, where p>0, q>0 .

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3. Find the area lying between the parabola $y = 4x - x^2$ and the line $y = x$.

4. Evaluate $\int_0^{\log 2}\int_0^{x}\int_0^{x+y} e^{x+y+z} dzdydx$.

Section-C

Note: *Attempt Any Three Questions* 3×3=9

1. To show that $\Gamma m \Gamma\left(m+\frac{1}{2}\right) = \frac{\sqrt{\Pi}}{2^{2m-1}}\Gamma 2m$, Where m is positive.

2. Let D be the region in the first quadrant bounded by x=0, y=0 and x+y = 1.Change the variables x,y to u, v, where $x+y = u$, $y = uv$, and evaluate $\iint_D xy(1-x-y)^{\frac{1}{2}} dxdy$.

3. Find the mass of a solid $\left(\frac{x}{a}\right)^p + \left(\frac{y}{b}\right)^q + \left(\frac{z}{c}\right)^r = 1$, the density at any point being $\rho = kx^{l-1}y^{m-1}z^{n-1}$, Where x, y, z are all positive.

4. Change the order of integration and evaluate
$$\int_0^a \int_{\sqrt{ax}}^{a} \frac{y^2}{\sqrt{y^4 - a^2x^2}} dydx..$$