NEW SCHEME

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Second Semester B.E Degree Examination, February/March 2005

Common to All Branches

Engineering Mathematics II

Time: 3 hrs.] [Max.Marks : 100

Note: *1. Answer any FIVE full questions choosing at least one question from each part.*
2. All questions carry equal marks.

Part A

1. (a) Show that for the curve $r^2 \sec 2\theta = a^2$, $\rho = \frac{a^2}{3r}$ **(7 Marks)**

(b) State and prove Lagranges' mean value theorem and find its geometrical interpretation. **(7 Marks)**

(c) Obtain Taylor's series expansion of log (cos x) about the point $x = \frac{\pi}{3}$ upto the fourth degree term. **(6 Marks)**

2. (a) Evaluate :

i) $\lim_{x \to \frac{\pi}{2}} \frac{\log(\cos x)}{\tan x}$

ii) $\lim_{x \to 0} \left(\frac{1}{x} - \frac{1}{e^x - 1} \right)$ **(7 Marks)**

(b) Explain e^{ax+by} in the neighborhood of the origin upto the third degree term. **(7 Marks)**

(c) If x, y, z are the angles of a triangle show that the maximum value of cos x cos y cos z is $\frac{1}{8}$. **(6 Marks)**

PART B

3. (a) Change the order of integration and hence evaluate $\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} xy \, dy \, dx$. **(7 Marks)**

(b) Evaluate $\int_0^1 \int_0^{1-x} \int_0^{1-x-y} \frac{dz \, dy \, dx}{(1+x+y+z)^3}$ **(7 Marks)**

(c) Show that $\int_{-1}^{1} (1+x)^{p-1} (1-x)^{q-1} \, dx = 2^{p+q-1} \beta(p, q)$. **(6 Marks)**

4. (a) A particle moves along the curve $x = 1 - t^3$, $y = 1 + t^2$ and $z = 2t - 5$. Determine its velocity and acceleration. Find the components of velocity and acceleration at $t = 1$ in the direction $2\vec{i} + \vec{j} + 2\vec{k}$. **(7 Marks)**

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