Roll No ....

BE - 301 (NGS)
B.E. III Semester
Examination, December 2012
Mathematics-III
(Common for all Branches)
(Non-Grading System Only)
Time : Three Hours

Maximum Marks : 70/100

Note : 1. *Answer any Five questions.*
2. *All questions carry equal marks.*

1. a) Find the analytic function of which the imaginary part is
$V = 3x^2y - y^3$.

   b) Evaluate $\int_c \dfrac{e^z}{z-2} dz$, where C is the circle

   i) $|z| = 3$ ii) $|z| = 1$

2. a) Evaluate by the Cauchy - Residue theorem, the integral.

$$\int_c \frac{dz}{z^2(z+1)(z-1)} ; c : |z| = 3$$

   b) Find the condition where the transformation $w = \dfrac{az+b}{cz+d}$

   transforms the unit circle in the w - plane into a straight line.

3. a) Calculate the approximate value of sin x for x = 0.54, using the following table:

x :   0.5   0.7   0.9   1.1   1.3   1.5

sin x : 0.47943   0.64422   0.78333   0.89121   0.96356   0.99749

b) By means of Newton's divided difference formula, find the value of $f(8)$ and $f(15)$ from the following table:

x :	4	5	7	10	11	13
$f(x)$:	48	100	294	900	1210	2028

4. a) A curve is drawn to pass through the following points:

x :	1	1.5	2	2.5	3	3.5	4
y :	2	2.4	2.7	2.8	3	2.6	2.1

Estimate the area bound by the curve, x-axis and lines $x = 1$, $x = 4$. Also find the volume of solid generated by revolving this area using Weddle's rule.

b) Given that:

x :	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y :	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ at $x = 1.1$ and $x = 1.6$

5. a) Find a root of the equation $x^3 + 2x^2 + 10x - 20 = 0$ by Newton - Raphson method.

b) Solve by Jacobi's iteration method the equations:
$10x + y + z = 12$
$2x + 10y + z = 13$
$2x + 2y + 10z = 14$

6. a) Using modified Euler's method, obtain a solution of the

equation $\frac{dy}{dx} = x + \left|\sqrt{y}\right|$, with initial condition $y = 1$ at $x = 0$,

for the range $0 \le x \le 0.6$ in step of 0.2.

b) Apply Runge - Kutta method to find an approximate value

of y, when $x = 0.2$, given that $\frac{dy}{dx} = x + y$ and $y = 1$, when

$x = 0$.

7. a) Using graphical method, find the maximum value of
$z = 2x + 3y$ subject to the constraints $x + y \le 30$,

$y \ge 3$, $0 \le y \le 12$, $0 \le x \le 20$, $x - y \ge 0$, $x, y \ge 0$.

b) Find the initial basic feasible solution of the following
transportation problem by North - West corner rule and
hence find its optimal solution.

	D_1	D_2	D_3	D_4	Availability
0_1	21	16	25	13	11
0_2	17	18	14	23	13
0_3	32	27	18	41	19
Requirement	6	10	12	15	43

8. a) A T.V. repairman finds that the time spent on his jobs have
an exponential distribution with mean of 30 minutes. If
he repairs set in the order in which they come in, and if
the arrival of sets is approximately poisson with an average
rate of 10 per 8 hour day, what is repairman's expected
idle time each day? How many jobs are ahead of the average
set just brought in?

b) Write a short notes on:
i) Robust design method.
ii) Taguchi loss function.

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