PVP 14

Code: CE1T1, ME1T1, CS1T1, IT1T1, EE1T1, EC1T1, AE1T1

I B. Tech - I Semester – Regular / Supplementary Examinations
November 2018

ENGINEERING MATHEMATICS - I

(Common for all Branches)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11 x 2 = 22 M

1.

a) If $\frac{dx}{dt} + \frac{x}{t \log t} = \frac{1}{t}$, then find the integrating factor.

b) Find the particular integral of $(D^2+1)y = \sin x$

c) State Newton's law of cooling.

d) State Rolle's theorem.

e) Expand e^x in powers of x second degree term.

f) Evaluate $\int_{\theta=0}^{\frac{\pi}{2}} \int_{r=0}^{\infty} e^{-r^2} r dr d\theta$

g) Evaluate $\int_0^1 \int_y^1 e^{-x} \, dx \, dy$

h) State Stoke's theorem.

i) Find $div \, \bar{F} \; if \; \bar{F} = xyz\boldsymbol{i} + 3x^2y\boldsymbol{j} + (xz^2 - y^2z)\boldsymbol{k}$ at point (2,-1,1).

j) Show that β(m, n) = $2 \int_0^{\frac{\pi}{2}} sin^{2m-1} \, x \, cos^{2n-1} x \, dx$

k) Write normal equations to fit a quadratic curve $y=ax^2+bx+c$

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Solve $(D^2 + 1)y = \sec x$ by method of parameters. 8 M

   b) Show that the family of confocal and coaxial parabolas $y^2 = 4a(x + a)$ where a is an arbitrary constant are self orthogonal. 8 M

3. a) In the plane triangle ABC, find the maximum value of $\cos A \cos B \cos C$ 8 M

   b) Verify Rolle's Theorem for the function $f(x) = \frac{x^2-4x}{x+2}$ in (0,4) 8 M

4. a) Evaluate $\iint (x + y)^2 \, dxdy$ over the area bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ 8 M

   b) Evaluate the double integral $\int_0^a \int_{\sqrt{ax}}^a \frac{y^2}{\sqrt{y^4-a^2x^2}} dxdy$ by changing the order of integration. 8 M

5. a) Find the directional derivative of the function $f(x, y, z) = x^2 + y^2 + 2z^2$ at the point $P(-1,2,3)$ in the direction of $4i - 2j + k$. 8 M

b) Using Green's theorem, evaluate $\int_C (3x^2 - 8y^2)\,dx + (4y - 6xy)dy$ where C is a boundary of the region bounded by $y = \sqrt{x}\ and\ y = x^2$. 8 M

6. a) Define Beta function and gamma function and find the relation between them. 8 M

b) Fit a second degree polynomial for the data $(1,2), (2,5), (4,9), (6,10)$. 8 M