**Code: 9ABS301** **R09**

B.Tech II Year I Semester (R09) Supplementary Examinations June 2017

**MATHEMATICS - II**

(Common to AE, BT, CE & ME)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Solve the system $\lambda$x + y + z = 0; x + $\lambda$y + z = 0; x + y + $\lambda$z = 0, if the system has non-zero solution only.

(b) Solve the equations: x + y – z + t = 0; x – y + 2z – t = 0; 3x + y + t = 0.

2 (a) Reduce the quadratic form to canonical form by Lagrange's reduction:

$$2x_1^2+7x_2^2+5x_3^2-8x_1x_2-10x_2x_3+4x_1x_3$$

And hence find rank signature of the quadratic form.

(b) Find the rank and signature of the quadratic form $\boldsymbol{x^2-4y^2+6z^2+2xy-4xz+2w^2-6zw}$.

3 (a) If $f(x)=x^2,\ -l\le x\le l$, obtain the Fourier series and deduce that $\frac{\pi^2}{12}=\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}+----$

(b) Expand $f(x)=e^x$ as a Fourier series in the interval $(-l,l)$

4 Find the Fourier transform of $f(x)=\begin{cases} a^2-x^2, & if\ |x|<a \\ 0, & if\ |x|>a>0 \end{cases}$

Hence show that $\int_0^\infty \frac{\sin x-\cos x}{x^3}dx=\frac{\pi}{4}$

5 (a) Form the partial differential equation by eliminating the arbitrary function f from $xyz = f(x^2 + y^2 + z^2)$.

(b) Using the method of separation of variables, solve $u_{xt} = e^{-t}\cos x$ with $u(x, 0) = 0$ and $u(0, t) = 0$.

6 (a) Evaluate: (i) $\Delta[f(x)\,g(x)]$ (ii) $\Delta\left[\frac{f(x)}{g(x)}\right]$.

(b) Given $u_0 = 580$, $u_1 = 556$, $u_2 = 520$ and $u_4 = 385$ find $u_3$.

7 (a) Fit the curve $y = ae^{bx}$ to the following data:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *x* | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| *y* | 20 | 30 | 52 | 77 | 135 | 211 | 326 | 550 | 1052 |

(b) The following gives the velocity of a particle at time t.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *t(sec.)* | 0 | 2 | 4 | 6 | 8 | 10 | 12 |
| *v(m/sec.)* | 4 | 6 | 16 | 34 | 60 | 94 | 136 |

Find the distance moved by the particle in 12 sec. and also the acceleration at t = 2 sec.

8 Use Milne's method to find y(0.8) and y(1.0) from $y' = 1 + y^2$, y(0) = 0. Find the initial values y(0.2), y(0.4) and y(0.6) from the Taylor's series method.

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