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## End Term Examinations (April 2019)

**School:** School of Engineering

**Program:** B.Tech. (MX, CE & BM )

**Course:** Higher Engineering Mathematics – II

**Course Code:** ENG202

**Semester:** IV

**Max Marks:** 30

**Duration (Mins) :** 90

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- Note:
1. All the questions are compulsory.
  2. Use of non-programmable calculator is allowed.
  3. Assume the suitable data wherever necessary.
  4. Figures to the right indicates full marks.
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### Q.1 Solve any two:

a) If  $f(x) = x^2$  in  $(0,2)$  then find half range cosine series. [05]

b) The turning moment  $T$  units of the crank shaft of a steam engine is given for a series of the crank angle  $\theta$  in degrees. [05]

$\theta$	0	30	60	90	120	150
$T$	0	5224	8097	7850	5499	2626

Find the first two terms in a series of Sine to represent  $T$ . Also calculate  $T$  when  $\theta = 75$ .

a) Form the partial differential equation from the general solution  $z = (x^2 + a)(y^2 + b)$ . [05]

Q.2 a) Obtain  $f(k)$  given that  $f(k + 1) + \frac{1}{2} f(k) = \left(\frac{1}{2}\right)^k$ , [05]

$k \geq 0, f(0) = 0$ .

b) Find  $L^{-1}\left[\frac{1}{s(s^2+a^2)}\right]$  using Convolution theorem. [05]

**Q.3** Solve any two:

a) Find  $z\{f(k)\}$  where  $f(k) = \frac{2^k}{k!}, k \geq 0$ .

[05]

b) By considering Fourier sine integral of  $e^{-mx}, m > 0$ , Prove that  $\int_0^\infty \frac{\lambda \sin \lambda x}{\lambda^2 + m^2} d\lambda = \frac{\pi}{2} e^{-mx}, m > 0, x > 0$ .

[05]

c) Find Lagrange's interpolation polynomial for the following data:

[05]

X	0	1	2
Y	4	3	6

Also find: (i)  $y$  at  $x=1.5$ , (ii)  $\frac{dy}{dx} =$  at  $x = 0.5$

and (iii)  $\int_0^3 y dx$ .