**Roll No** ...................................

# MA-220(CE)-CBCS
## B.E., IV Semester
Examination, June 2020
## Choice Based Credit System (CBCS)
## Mathematics - III
### *Time : Three Hours*

***Maximum Marks : 60***

*Note:* i)   Attempt any five questions.
   ii)  All questions carry equal marks.

1.  a)  Find a series of sines and cosines of multiples of x, which will represent $x + x^2$ in the internal $-\pi < x < \pi$ Hence show that $\dfrac{\pi^2}{6} = 1 + \dfrac{1}{2^2} + \dfrac{1}{3^2} +$

   b)  Expand $f(x) = \pi x - x^2,\ 0 < x < \pi$ in a half-range sine series.

2.  a)  Find the Fourier transform of $f(x) = \begin{cases} x\ ,|x| \le a \\ 0\ ,|x| > a \end{cases}$

   b)  Find the Fourier consine transform of

   $f(x) = \begin{cases} \cos x\ , & 0 < x < 9 \\ 0 & , & x > 9 \end{cases}$

3.  a)  Find $L\left\{\dfrac{\sin t}{t}\right\}$

   b)  Prove that $L\left\{\dfrac{\cos\sqrt{t}}{\sqrt{t}}\right\} = \dfrac{\pi}{s}e^{-\frac{1}{4}s}$

4. a) Find $L^{-1}\left\{\dfrac{s+1}{s^2+6s+25}\right\}$

   b) Solve $y'' - 2y' + 2y = 0$, given $y(0) = y'(1) = 1$
      (By Laplace transform method)

5. a) Use Cauchy-Riemann equation to find $v$ when
      $u = 3x^2y - y^3.$

   b) Evaluate the integral $\int\limits_0^{1+i} z^2\, dz$

6. a) Evaluate the following integral using Cauchy's integral formula:

      $$\int \dfrac{(4-32)}{z(z-1)(z-2)}\, dz$$

   b) Show that $\int\limits_0^{2\pi} \dfrac{d\theta}{a + b\cos\theta} = \dfrac{2\pi}{\sqrt{a^2 - b^2}}$, where $a > b > 0$.

7. a) Find a real root of the equation $f(x) = x^3 - 4x - 9 = 0$, using bisection method in four stages.

   b) Apply False position method to solve the equation
      $3x - \cos x - 1 = 0$

8. a) By using Newton-Raphson method find the root of $x^4 - x - 10 = 0$, which is nearer to 2, correct to three places of decimal.

   b) Find a quadratic factor of the polynomial
      $x^4 + 5x^3 + 3x^2 - 5x - 9 = 0$, starting with $p_0 = 3$, $q_0 = -5$, by using Bairstow's method.

<div align="center">******</div>

MA-220(CE)-CBCS