Model Paper-I

B. TECH(SEM-II)

SUBJECT (Sub Code): MATHEMATICS-II (BAS-203)

SECTION-A

Q.1	Attempt all parts	(7×2=14)

a.	Find The C.F $D^5y-D^3y=0$.	**CO1**
b.	Find the P.I $D^2x-(a+b)Dy+aby = e^{ax}+e^{bx}$.	**CO1**
c.	Find Laplace transform of t.sint.	**CO2**
d.	Find Laplace transform of t.cos3t.	**CO2**
e.	Test the convergence of the following series: $\frac{1}{\sqrt{1}+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+$ ------------------	**CO3**
f.	Find the Fourier constant a_1 of $f(x)=x,\quad -\pi \le x \le \pi$.	**CO3**
g.	Define conformal mapping.	**CO4**
h.	Find the residue of a function f(z) = $\frac{z^2}{(z+1)^2(z-2)}$ at its double pole.	**CO4**
i.	Define singularity of function with an example.	**CO5**
j.	State Laurent's series.	**CO5**

SECTION-B

Q.2	Attempt any three parts	(3×7=21)

a.	Solve $D^2y+4y=\sin^2 2x$ with conditions y (0) =0, $y'(0)=0$.	**CO1**
b.	Find the Laplace transform of the square-wave function of period $'a'$ defined as: $$f(t)=\begin{cases}1 & , \; 0 \le t \le \frac{a}{2} \\ -1 & , \; \frac{a}{2} < t < a\end{cases}$$.	**CO2**
c.	Obtain a Fourier expression for $f(x) = x^3$ for $-\pi < x < \pi$.	**CO3**
d.	State and proof Cauchy's Integral Formula.	**CO4**
e.	Expand the function $\sin^{-1} z$ in power of z (By Taylor series).	**CO5**

SECTION-C

Q.3	Attempt any one part	(1×7=7)
a.	Solve the simultaneous differential equation $d^2x/dt^2 - 4dx/dt + 4x = y$ $d^2y/dt^2 + 4dy/dt + 4y = 25x + 16e^t$	CO1
b.	Solve $(D^3+D^2+D+1)y = \sin^2 x$.	CO1

Q.4	Attempt any one part	(1×7=7)
a.	Using Laplace Transform to evaluate $\int_0^\infty \frac{e^{-t}\sin t}{t}dt$.	CO2
b.	Find the inverse Laplace transform by convolution theorem $\frac{s^2}{(s^2+a^2)(s^2+b^2)}$.	CO2

Q.5	Attempt any one part	(1×10=10)
a.	Test for convergence the series $\frac{1}{1.2.3}+\frac{3}{2.3.4}+\frac{5}{3.4.5}+$...........	CO3
b.	Find the Fourier series to represent the function $f(x) = \begin{Bmatrix} -K & , -\pi < x < 0 \\ K & , 0 < x < \pi \end{Bmatrix}$. Also deduce that $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7}...$	CO3

Q.6	Attempt any one part	(1×7=7)
a.	Find the value of A and B such that the function is: $f(z) = x^2 + Ay^2 - 2xy + i(Bx^2 - y^2 + 2xy)$ is analytic.	CO4
b.	Prove that the function $f(z)$ is defined by $f(z) = \frac{x^2y^5(x+iy)}{x^4+y^{10}}$, $z \neq 0$ *and* $f(0) = 0$ is continuous and Cauchy-Riemann equations are satisfied at the origin, yet $f'(0) = 0$ does not exist.	CO4

Q.7	Attempt any one part	(1×7=7)
a.	Prove that cross ratio preserved in bilinear transformation.	CO5
b.	Evaluate the following integrals by using calculus of residues: $\int_0^{2\pi} \frac{1}{a+b\sin\theta}d\theta$, $a > \lvert b \rvert$	CO5