BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)
B. Tech. Sem - II E&TC :SUMMER- 2022
SUBJECT : DIFFERENTIAL EQUATIONS & COMPLEX ANALYSIS

Day : Tuesday | Time : 10:00 AM-01:00 PM
Date : 26-07-2022 | **S-24099-2022** | Max. Marks : 60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable calculator is allowed.

Q.1 Solve by method of variation of parameters **(10)**

$\left(D^2-2D+2\right)y=e^x\tan x$.

OR

Solve by method of undetermined coefficients

$\frac{d^2y}{dx^2}-y=e^x\sin 2x$

Q.2 Form the partial differential equation from **(10)**

$z=x^2f(y)+y^2g(x)$

OR

Solve :

a) $\frac{\partial^2 z}{\partial x^2}+\frac{\partial^2 z}{\partial x\partial y}-6\frac{\partial^2 z}{\partial y^2}=y\cos x$ **(05)**

b) $\left(D^2-2DD'-D'^2\right)z=e^{x+y}$ **(05)**

Q.3 Find all values of $(1+i)^{1/5}$ show that their product is $1+i$. **(10)**

OR

Evaluate $\int_0^{2+i}(\bar{z})^2\,dz$ along

i) line $y=\frac{x}{2}$

ii) the real axis to 2 and then vertically to $2+i$.

Q.4 Find bilinear transformation which maps points $z=-1,\infty,i$ to $w=\infty,i,1$. **(10)**

OR

Show that $w=iz$ is rotation of z-plane through an angle $\frac{\pi}{2}$. In the counter clockwise direction, find and plot images of :

i) $0<x<1$ **ii)** $x>2$ **iii)** $2<x<3$ **iv)** $1<x<2$ and $2<y<3$.

Q.5 Find Taylor series of : **(10)**

a) $f(z)=e^z$ about $z=a$ **b)** $f(z)=\log(1+z)$ about $z=0$.

OR

Find Laurent's series for the function $f(z)=\frac{e^z}{z(z-1)}$ about $z=1$. Find region of convergence.

Q.6 Find power series solution of D.E. **(10)**

$(1-x^2)y''-2xy'+2y=0$.

OR

Find Taylor series expansion of

$f(z)=\frac{1}{(2z+1)^3}$ about **i)** $z=0$ **ii)** $z=2$.

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