B. N. BANDODKAR COLLEGE OF SCIENCE, THANE

F.Y.B.SC. (INFORMATION TECHNOLOGY) SEMESTER – II ADDITIONAL EXAMINATION; JUNE 2015

COURSE CODE– USIT202

Duration: 2½ Hrs **Total Marks: 75**

N.B. 1. All questions are compulsory.

Q. 1 **Answer *any two* out of following** **10**

a Find the modulus and argument of $\frac{1}{2}+\frac{\sqrt{3}}{2}i$

b If z_1=10+5i, z_2=6-8i, find $\left|\frac{z1\ z2}{z1+z2}\right|$

c If $=1+i\sqrt{3}$, then show that z^2+4=2z.

d If z_1 =3 + 2i and z_2= 4 - 3i ,find $\frac{1}{z1}+\frac{1}{z2}$ in the form of a + ib

Q. 2 **Answer *any two* out of following** **10**

a Prove that, $cosh^2x=\frac{1}{1-\frac{1}{1-\frac{1}{1-cosh^2x}}}$

b Separate the real and imaginary parts of tan (x + iy).

c If $f(z)=2x+ixy^2$ then show that f'(z) does not exist.

d Show that given function is analytic and find it's derivative: sinhz

Q. 3 **Answer *any two* out of following** **10**

a Find the Laplace Transform of $(\sin 2t-cos2t)^2$

b Find the Inverse Laplace Transform of $\frac{3s+4}{s^2+16}$

c Find $L[(1+2t-t^2+t^3)H(t-1)]$ using Heaviside's Unit Step Function.

d Find the Inverse Laplace Transform of $\frac{4s+15}{16s^2-25}$

Q. 4 **Answer *any two* out of following** **10**

a Solve the integration: $\sqrt{1-sin2x}$

b Evaluate $\int_0^2 x^3\ \sqrt{2-x}\,dx$

c Integrate : $\int \frac{6x^2+2x-2}{x^3-3}$ dx

d Evaluate : $\int_0^\infty e^{\frac{-x^2}{4}}$ dx

Q. 5 **Answer *any two* out of following** **10**

a Find the fourier Series for f(x) in (0,2π) where $f(x)=\begin{cases} x, & 0<x\leq\pi \\ 2\pi-x, & \pi<x<2\pi \end{cases}$

b Find f(x) if it's Fourier cosine Transform is e^{-s}.

c Obtain the fourier expansion of $f(x) = \left(\frac{\pi - x}{2}\right)^2$ in the interval $0 \le x \le 2\pi$ and $f(x + 2\pi) = f(x)$ Also deduce that, $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$

d Find the Fourier sine Transform of f(x) if , $f(x) = \begin{cases} 0, & 0 < x < a \\ x, & a \le x \le b \\ 0, & x > b \end{cases}$

Q. 6 **Answer *any two* out of following** **10**

a Evaluate $\int_1^2 \int_0^x \frac{dy\,dx}{x^2+y^2}$

b Evaluate $\int_0^1 \int_{x^2}^x xy(x+y)dy\,dx$

c Find $\int_0^1 \int_0^y xy\, e^{-x^2}\, dx\, dy$

d Evaluate $\int_{-1}^1 \int_0^z \int_{x-z}^{x+z} (x+y+z)\, dz\, dx\, dy$

Q. 7 **Answer *any three* out of following** **15**

a Prove that, $\left[\frac{1+sin\alpha+ icos\alpha}{1+sin\alpha - icos\alpha}\right]^n = cos\left[\frac{n\pi}{2} - n\alpha\right] + isin\left[\frac{n\pi}{2} - n\alpha\right]$

b Find k such that $\frac{1}{2}\log(x^2+y^2) + i\tan^{-1}\frac{kx}{y}$ is analytic.

c Using the fundamental definition, find the laplace transform of f(t), where f(t) = t , for 0 < t < 4 and f(t) = 5 for t > 4.

d Prove that $erf_c(-x) + erf_c(x) = 2$

e Find the Fourier cosine Transform of f(x) if , $f(x) = \begin{cases} coskx, & 0 < x < a \\ 0, & x > a \end{cases}$

f Find $\int_0^a \int_0^{\sqrt{a^2-y^2}} \sqrt{a^2 - x^2 - y^2}\, dx\, dy$

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