G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY

Accredited by NAAC with "A" Grade, Recognized by UGC under 2(f) & 12(B)

(Affiliated to JNTUA & Approved by AICTE)

B.Tech I Year II Semester (R15) MID-II Descriptive Examinations May-2017

SET-1

MATHEMATICS-II (15A54201) **Date: 08/05/2017**

Time: 90 minutes **(Common to ECE&EEE)** Max.Marks:30

PART-A (5 X 2 = 10M)

ANSWER ALL QUESTIONS.EACH QUESTION CARRY EQUAL MARKS

			Marks	Unit	CO	Cognitive level
1	a	State and prove Linearity Property of $Fourier\ transform$	2	III	C106.4	**Remember**
	b	Find the Fourier cosine transforms of $e^{-ax}\ \cos ax\,, a > 0$	2	III	C106.4	**Apply**
	c	$Find\ \ Z(n^p)$	2	V	C106.6	**Apply**
	d	Find $Z[(\cos\theta + i\sin\theta)^n]$. $Hence\ evaluate\ \ Z(\cos\ n\theta)\ \ and\ Z(\sin n\,\theta)$	2	V	C106.6	**Apply**
	e	Form the P.D.E by eliminating arbitrary constants a & b from $z = ax + by + \frac{a}{b} - b^2$	2	IV	C106.5	**Apply**

PART-B (2 X 10= 20M)

ANSWER ALL QUESTIONS

2. A) Express $f(x) = \begin{cases} \frac{\pi}{2}, for\ \ 0 \le x \le \pi \\ 0, \quad for\ \ x > \pi \end{cases}$ as a Fourier Sine integral and hence evaluate $\int_0^\infty \frac{1-\cos(\pi\lambda)}{\lambda}\sin(x\lambda)\ d\lambda$

Marks	Unit	CO	Cognitive level
5	III	**C106.4**	**Analyze**

B) Find the F.T of $f(x)$ defined by$f(x) = e^{\frac{-x^2}{2}}$, $-\infty < x < \infty$ and show that $f(x)$ is a self-reciprocal function

Marks	Unit	CO	Cognitive level
5	III	**C106.4**	**Apply**

(OR)

3. A) Find $Z^{-1}\left[\frac{Z}{Z^2+11Z+24}\right]$

Marks	Unit	CO	Cognitive level
5	V	**C106.6**	**Apply**

B) Use Convolution theorem to evaluate $Z^{-1}\left[\left(\frac{z}{z-a}\right)^3\right]$

Marks	Unit	CO	Cognitive level
5	V	**C106.6**	**Evaluate**

4.A) Using the Z –transform, Solve $4u_n - u_{n+2} = 0\ \ given\ that\ u_0 = 0, u_1 = 2$

Marks	Unit	CO	Cognitive level
5	V	**C106.6**	**Evaluate**

B) Find $Z\left(\frac{1}{n(n+1)}\right)$

Marks	Unit	CO	Cognitive level
5	V	**C106.6**	**Apply**

(OR)

5. Solve by the method of Separation of variables $u_x = 2u_t + u\,,\ where\ \ u(x,0) = 6e^{-3x}$

Marks	Unit	CO	Cognitive level
5	IV	**C106.5**	**Apply**

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SET-II

MATHEMATICS-II (15A54201) **Date: 08/05/2017**

Time: 90 minutes **(Common to ECE&EEE)** Max.Marks:30

PART-A (5 X 2 = 10M)

ANSWER ALL QUESTIONS.EACH QUESTION CARRY EQUAL MARKS

			Marks	Unit	CO	Cognitive level
1	a	State and prove Shifting Property of Fourier Transform	2	III	C106.4	Remember
	b	State and prove Change of Scale property of z –transforms	2	V	C106.6	Remember
	c	Use Convolution theorem to evaluate $Z^{-1}\left[\frac{z^2}{(z-4)(z-5)}\right]$	2	V	C106.6	Evaluate
	d	Form the P.D.E by eliminating arbitrary constants from $z=(x-a)^2+(y-b)^2=z^2\,Cot^2\alpha$ where α is a parameter	2	IV	C106.5	Apply
	e	Form the P.D.E by eliminating arbitrary functions from $xyz=f(x^2+y^2+z^2)$	2	IV	C106.5	Apply

PART-B (2 X 10 = 20M)

ANSWER ALL QUESTIONS

2. Find the Fourier sine and cosine transforms of $f(x)=\frac{e^{-x}}{x}$ *and hence deduce that* $\int_0^\infty \frac{e^{-ax}-e^{-bx}}{x}\sin x\,dx=\tan^{-1}\left(\frac{s}{a}\right)-\tan^{-1}\left(\frac{s}{b}\right)$

Marks	Unit	CO	Cognitive level
10	III	**C106.4**	**Apply**

(OR)

3. Show that the Fourier transform of $f(x)=\begin{cases}1-x^2 & if\ |x|<1\\ 0 & if\ |x|>1\end{cases}$ is $\frac{4}{p^3}(\sin p-p\cos p)$.Using Parseval's identity prove that $\int_0^\infty\left(\frac{\sin x-x\cos x}{d^3}\right)dx=\frac{\pi}{15}$

Marks	Unit	CO	Cognitive level
10	III	**C106.4**	**Analyze**

4. A) Find $Z^{-1}\left[\frac{3z^2+z}{(5z-1)(5z+2)}\right]$

Marks	Unit	CO	Cognitive level
5	V	**C106.6**	Apply

B) Solve the difference equation, using Z –transform $u_{n+2}-3u_{n+1}+2u_n=0$ *given that* $u_0=0, u_1=1$

Marks	Unit	CO	Cognitive level
5	V	**C106.6**	Apply

(OR)

5. Solve $\frac{\partial^2 u}{\partial x\,\partial t}=e^{-t}\cos x$, *given that* $u=0$ *when* $t=0$ *and* $\frac{\partial u}{\partial t}=0$, *when* $x=0$

Marks	Unit	CO	Cognitive level
5	V	**C106.5**	Apply

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B.Tech I Year II Semester (R15) MID-II Descriptive Examinations May-2017

SET-III

MATHEMATICS-II (15A54201) **Date: 08/05/2017**

Time: 90 minutes **(Common to ECE&EEE)** Max.Marks:30

PART-A (5 X 2 = 10M)

ANSWER ALL QUESTIONS.EACH QUESTION CARRY EQUAL MARKS

			Marks	Unit	CO	Cognitive level
1	a	State and prove Modulation Theorem of Fourier Transform	2	III	C106.4	Remember
	b	Find the Fourier cosine transforms of $e^{-ax}, a > 0$	2	III	C106.4	Apply
	c	Find (i) $Z(na^n)$ (ii) $Z\left(\frac{1}{n}\right)$	2	V	C106.6	Apply
	d	$Find\ \ Z(\mathrm{a^n}\cos nt)$	2	V	C106.6	Apply
	e	Form the P.D.E by eliminating arbitrary constants a & b from $\log(az-1) = x + ay + b$	2	IV	C106.5	Apply

PART-B (2 X 10 = 20M)

ANSWER ALL QUESTIONS

2. A) Using Fourier integral, Show that $e^{-ax} - e^{-bx} = \frac{2(b^2-a^2)}{\pi}\int_0^\infty \frac{\lambda \sin \lambda x\, d\lambda}{(\lambda^2+a^2)(\lambda^2+b^2)}, a, b > 0$

Marks	Unit	CO	Cognitive level
5	III	**C106.4**	**Evaluate**

B) Evaluate the following using Parseval's identity a) $\int_0^\infty \frac{x^2}{(a^2+x^2)^2}dx(a>0)$ (b) $\int_0^\infty \frac{dx}{(a^2+x^2)^2}(a>0)$

Marks	Unit	CO	Cognitive level
5	III	**C106.4**	**Evaluate**

OR

3. A) State and prove Shifting property of z –transforms

Marks	Unit	CO	Cognitive level
5	V	**C106.6**	**Remember**

B) Find i) $Z(n^3)$ ii) $Z(n^4)$

Marks	Unit	CO	Cognitive level
5	V	**C106.6**	Apply

4. A) Find $Z^{-1}\left[\frac{8z-z^3}{(4-z)^3}\right]$

Marks	Unit	CO	Cognitive level
5	V	**C106.6**	Apply

B) Using the Z –transform, Solve $y_{n+2} + 2y_{n-1} + y_n = n \ \ given\ that\ y_0 = y_1 = 0$

Marks	Unit	CO	Cognitive level
5	V	**C106.6**	Apply

OR

5. Solve by the method of separation of variables $u_x = 4u_y \ \ with\ \ u(0,y) = 8e^{-3y}$

Marks	Unit	CO	Cognitive level
10	IV	**C106.5**	Apply

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B.Tech I Year II Semester (R15) MID-II Descriptive Examinations May-2017

SET-IV

MATHEMATICS-II (15A54201) **Date: 08/05/2017**

Time: 90 minutes **(Common to ECE&EEE)** Max.Marks:30

PART-A (5 X 2 = 10M)

ANSWER ALL QUESTIONS.EACH QUESTION CARRY EQUAL MARKS

			Marks	Unit	CO	Cognitive level
1	a	Find the Fourier Sine Transforms of $f(x) = e^{-ax} \sin ax,\ a > 0$	2	III	C106.4	Apply
	b	Find $Z^{-1}\left[\frac{z^2}{(z-a)(z-b)}\right]$ using Convolution theorem	2	V	C106.6	Apply
	c	Find $Z[e^{-an} \cos n\theta]$	2	V	C106.6	Apply
	d	Form the P.D.E by eliminating arbitrary functions $f(x)$ & $g(x)$ from $z = f(x) + e^y g(x)$	2	IV	C106.5	Apply
	e	Form the P.D.E by eliminating arbitrary constants a & b from $2z = (x+a)^{1/2} + (y-a)^{1/2} + b$	2	IV	C106.5	Apply

PART-B (2 X 10 = 20M)

ANSWER ALL QUESTIONS

2. Find the Fourier transform of $f(x) = \begin{cases} a^2 - x^2, for\ |x| < a \\ 0,\ for\ |x| > a > 0 \end{cases}$ .Hence show that $\int_0^\infty \frac{\sin x - \cos x}{x^3} dx = \frac{\pi}{4}$

Marks	Unit	CO	Cognitive level
5	III	**C106.4**	**Evaluate**

(OR)

3. A)Find $Z^{-1}\left[\frac{2z^2+3z}{(z+2)(z-4)}\right]$

Marks	Unit	CO	Cognitive level
5	IV	**C106.4**	**Apply**

B) Find $Z^{-1}\left[\frac{4z^2-2z}{z^3-5z^2+8z-4}\right]$

Marks	Unit	CO	Cognitive level
5	IV	**C106.4**	**Apply**

4. A) Form the P.D.E by eliminating arbitrary constants a, b, c from $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$

Marks	Unit	CO	Cognitive level
5	IV	**C106.6**	**Apply**

B) Solve by the method of Separation of variables $2x\, z_x - 3yz_y = 0$

Marks	Unit	CO	Cognitive level
5	IV	**C106.5**	**Apply**

(OR)

5. A tightly stretched string of length l has its ends fastened at $x = 0, x = l$ the midpoint of the string is then taken to height $'h'$ and then released from rest in that position .Find the lateral displacement of a point of the string at time $'t'$ from the instant of release.

Marks	Unit	CO	Cognitive level
5	IV	**C106.5**	**Apply**