G.PULLAIAH COLLEGE OF ENGINEERING& TECHNOLOGY

B. Tech II Year-II Semester (R15) I MID EXAMINATIONS

MATHEMATICS-IV (COMMON TO ECE & EEE) **SET-1**

Time: 1hour 30 min Max Marks: 30 **Date: 28/02/2018**

QUESTION NO 1 IS COMPULSORY. ANSWER ONE FROM 2 (OR) 3 AND ONE FROM 4 (OR) 5.

PART-A

S. No	Questions	Marks	UNIT	CO	Cognitive level
1	A) Compute Γ(4.5)	2	I	C209.1	Apply
	B) Evaluate $\int_0^1 x^5\,(1-x)^3 dx$	2	I	C209.1	Evaluate
	C) Define beta and gamma functions	2	I	C209.1	Remember
	D) Show that P_1(x) =x	2	II	C209.2	Apply
	E) Compute $J_0(0)$	2	II	C209.2	Apply

PART-B

S. No	Questions	Marks	UNIT	CO	Cognitive level
2	A)To show $\beta(m,n)\int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}}\,dx \int_0^\infty \frac{x^{n-1}}{(1+x)^{m+n}}\,dx$	5	I	C209.1	Apply
	B) Evaluate $\int_0^1 \frac{x^2}{\sqrt{1-x^5}}$ dx in terms of Beta function	5	I	C209.1	Evaluate
3	A) Show that $\int_0^1 x^m(\log x)^n$ dx =$\frac{(-1)^n n!}{(m+1)^{n+1}}$, where n is a positive integer and m> -1	5	I	C209.1	Apply
	B) Evaluate $\int_0^\infty a^{-bx^2}\,dx$	5	I	C209.1	Evaluate
4	A)Show that $J_{-n}(x) = (-1)^n J_n(x)$ where n is a positive integer	5	II	C209.2	Apply
	B) Prove that $J_0^2 + 2(J_1^2+J_2^2+J_3^2+--) = 1$	5	II	C209.2	Apply
5	A) Show that $\int_{-1}^1 x\,P_n(x)\,P_{n-1}(x)dx = \frac{2n}{4n^2-1}$	5	II	C209.2	Apply
	B) Prove that $(2n+1)xp_n(x) = (n+1)p_{n+1}(x) + np_{n-1}(x)$	5	II	C209.2	Apply

G.PULLAIAH COLLEGE OF ENGINEERING& TECHNOLOGY

B. Tech II Year-II Semester (R15) I MID EXAMINATIONS **SET-2**

MATHEMATICS-IV (COMMON TO ECE & EEE)

Time: 1hour 30 min Max Marks: 30 **Date: 28/02/2018**

QUESTION NO 1 IS COMPULSORY. ANSWER ONE FROM 2 (OR) 3 AND ONE FROM 4 (OR) 5

PART-A

S. No	Questions	Marks	UNIT	CO	Cognitive level
1	A) Find $\beta(2.5,1.5)$	2	I	C209.1	Remember
	B) Compute $\Gamma\left(\frac{-7}{2}\right)$	2	I	C209.1	Apply
	C) Prove that $\Gamma(\frac{1}{2}) = \sqrt{\pi}$	2	I	C209.1	Apply
	D) Show that $P_n(1) = 1$	2	II	C209.2	Apply
	E) Prove that $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi X}}\ \sin x$	2	II	C209.2	Apply

PART-B

S. No	Questions	Marks	UNIT	CO	Cognitive level
2	A) prove that $\beta(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$	5	I	C209.1	Apply
	B) show that $\beta(m,n) = 2\int_0^{\frac{\pi}{2}} sin^{2m-1}\theta\ cos^{2n-1}\theta d\theta$	5	I	C209.1	Apply
3	A) prove that $\int_0^{\infty} \sqrt{x}\ e^{-x^2}$ dx $=2\int_0^{\infty} x^2\ e^{-x^4}$ dx using Beta and Gamma functions	5	I	C209.1	Apply
	B) prove that $\Gamma(n) = \int_0^1 \left[\log\left(\frac{1}{x}\right)\right]^{n-1} dx$	5	I	C209.1	Apply
4)	Prove that $e^{\frac{x}{2}(t-\frac{1}{t})} = \sum_{-\infty}^{\infty} J_n(x)t^n$	10	II	C209.2	Apply
5	A)Prove that $\int_{-1}^{1} p_m(x)\,p_n(x)dx = o,\ form \neq n$	5	II	C209.2	Apply
	B) Show that $\int_{-1}^{1}(1-x^2)p_m^I(x)P_n^I(x)dx$=0,if m,n are distinct positive integers	5	II	C209.2	Apply

G.PULLAIAH COLLEGE OF ENGINEERING& TECHNOLOGY

B. Tech II Year-II Semester (R15) I MID EXAMINATIONS **SET-3**

MATHEMATICS-IV (COMMON TO ECE & EEE)

Time: 1hour 30 min Max Marks: 30 **Date: 28/02/2018**

QUESTION NO 1 IS COMPULSORY. ANSWER ONE FROM 2 (OR) 3 AND ONE FROM 4 (OR) 5

PART-A

S. No	Questions	Marks	UNIT	CO	Cognitive level
1	A) Compute $\Gamma(\frac{11}{2})$	2	I	C209.1	Apply
	B) Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{COt\theta}\, d\theta$	2	I	C209.1	Evaluate
	C) Prove that $\int_0^{\infty} e^{-x^4}\, dx = \frac{1}{4}\,\Gamma\left(\frac{1}{4}\right)$	2	I	C209.1	Apply
	D)) Show that $P_2(x) = \frac{3x^2-1}{2}$	2	II	C209.2	Apply
	E)Prove that $J_{\frac{-1}{2}}(x) = \sqrt{\frac{2}{\pi X}}\ \cos x$	2	II	C209.2	Apply

PART-B

S. No	Questions	Marks	UNIT	CO	Cognitive level
2	A) Prove that $\beta\left(m,\frac{1}{2}\right) = 2^{2m-1}\beta(m,m)$	5	I	C209.1	Apply
	B) Prove that $\Gamma(m)\Gamma(m+\frac{1}{2}) = \frac{\sqrt{\pi}}{2^{2m-1}}\Gamma(2m)$	5	I	C209.1	Apply
3	Prove that $\int_0^1 \frac{x^2}{\sqrt{1-x^4}}\, dx \ \int_0^1 \frac{dx}{\sqrt{1+x^4}} = \frac{\pi}{4\sqrt{2}}$	10	I	C209.1	Apply
4	A) Show that $J_4(x) = \left(\frac{48}{x^3} - \frac{8}{x}\right)J_1(x) + \left(1 - \frac{24}{x^2}\right)J_0(x)$	5	II	C209.2	Apply
	B) Show that $J_n(-x) = (-1)^n J_n(x)$ where n is positive or negative integers	5	II	C209.2	Apply
5	A) Express $x^3 - 2x^2 + x - 3$ in terms of Legendre polynomials	5	II	C209.2	Understand
	B) Using Rodrigue's formula ,prove that $\int_{-1}^{1} x^m\, p_n(x)dx = 0, If\ m < n$	5	II	C209.2	Apply

G.PULLAIAH COLLEGE OF ENGINEERING& TECHNOLOGY

B. Tech II Year-II Semester (R15) I MID EXAMINATIONS

MATHEMATICS-IV (COMMON TO ECE & EEE) **SET-4**

Time: 1hour 30 min Max Marks: 30 Date:**28/02/2018**

QUESTION NO 1 IS COMPULSORY. ANSWER ONE FROM 2 (OR) 3 AND ONE FROM 4 (OR) 5.

PART-A

S. No	Questions	Marks	UNIT	CO	Cognitive level
1	A)Compute $\beta(\frac{9}{2},\frac{7}{2})$	**2**	I	C209.1	Apply
	B) Evaluate $\int_0^\infty \frac{x^c}{c^x}dx$	**2**	I	C209.1	Evaluate
	C)Prove that $\Gamma(\frac{-1}{2}) = -2\sqrt{\pi}$	**2**	I	C209.1	Apply
	D) Express 1+x-x^2 in terms of Legendre polynomials	**2**	II	C209.2	Understand
	E) Show that $Sinx = 2J_1(x) - 2J_3(x) + 2J_5(x) - - - - -$	**2**	II	C209.2	Apply

PART-B

S. No	Questions	Marks	UNIT	CO	Cognitive level
2	A) If m,n are positive integers then prove that $\beta(m,n) = \frac{(m-1)!(n-1)!}{(m+n-1)!}$	5	I	C209.1	Apply
	B) To show $\int_a^b (x-a)^{m-1}(b-x)^{n-1}dx = (b-a)^{m+n-1}\beta(m,n)$	5	I	C209.1	Apply
3	A) prove that $\Gamma(\mathrm{n})\,\Gamma(1-\mathrm{n}) = \frac{\pi}{\sin n\pi}$	5	I	C209.1	Apply
	B)Define gamma function and evaluate $\int_0^\infty e^{-\sqrt{x}}$ dx	5	I	C209.1	Remember
4	A) Show that $\frac{d}{dx}[J_n^2 + J_{n+1}^2] = \frac{2}{x}[nJ_n^2 - (n+1)J_{n+1}^2]$	5	II	C209.2	Apply
	B) Express J_4(x) in terms of J_0(x) and J_1(x)	5	II	C209.2	Understand
5	Prove that $P_n(x) = \frac{1}{2^n(n!)}\frac{d^n}{dx^n}(x^2-1)^n$	10	II	C209.2	Apply