QPC: RA22BCA015 AR 22 Reg. No

GIET UNIVERSITY, GUNUPUR – 765022

B. C. A (Second Semester) Examinations, August' 2023

BCA20204 - Advanced Mathematical Computation

Time: 3 hrs Maximum: 70 Marks

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) **(1 x 10 =10 Marks)**

Q. 1 Answer ***ALL*** questions CO # PO #

a. $\sim(p \vee q)$ is logically equivalent to

(i) . $\sim p \wedge q$ (ii) .$\sim(p \vee q)$

(iii) .$\sim p \vee \sim q$ (iv) ..$\sim p \wedge \sim q$

b. If $A = \{a, b, c\}$,then the number of subset of A is CO1 PO1

(i) 8 (ii) 6

(iii) 10 (iv) 3

c. The modulus of Z=$1 + \sqrt{3}i$ is CO1 PO1

(i) $\sqrt{2}$ (ii) 2

(iii) $\sqrt{5}$ (iv) 4

d. The Scalar product of $5i + j - 3k$ and $3i - 4j + 7k$ is CO1 PO1

(i) 15 (ii) 10

(iii) -10 (iv) 0

e. Which of the following is Langrage's form for PDE CO1 PO1

(i) Pp – Qq=R (ii) P p + Q q=R

(iii) Pp+Qq=Rr (iv) Pp +q=R

f. If y=$e^x + 1$,then find $y'' - y'$ is CO1 PO1

(i) 0 (ii) 1

(iii) e^x (iv) $e^x + 1$

g. Find the Laplace transform of Sinat. CO1 PO1

(i) $\frac{s}{s^2+a^2}$ (ii) $\frac{s}{s^2+1}$

(iii) $\frac{a}{s^2+1}$ (iv) $\frac{a}{s^2+a^2}$

h. Find the Laplace inverse transform of $\frac{120}{s^6}$. CO1 PO1

(i) t^3 (ii) t^5

(iii) t^7 (iv) t^{12}

i. Find the cardinality of the set $A = \{1,2,9,8\}$ CO1 PO1

(i) 2 (ii) 4

(iii) 3 (iv) 5

j. The rank of $\begin{bmatrix} 4 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 5 \end{bmatrix}$ is equal to CO1 PO1

(i) 4 (ii) 5

(iii) 2 (iv) 3

PART – B: (Short Answer Questions) **(2 x 10=20 Marks)**

Q.2. Answer ***ALL*** questions

	Question	CO #	PO #
a.	If A={1,2,3,4,5} B={4,5,6,7,8} C={7,8,9,10,11} Find $A\cup B\cup C$,$A\cap (B\cup C)$.	CO1	PO2
b.	Check the Tautology $[(p \rightarrow q)\wedge q]\vee p$	CO1	PO2
c.	Write the truth table of conditional and Bi-conditional .	CO1	PO1
d.	If $z_1 = 6+3i$ and $z_2 = 2-i$, then find $\frac{z_1}{z_2}$.	CO2	PO2
e.	Find $i^1+i^2+i^3+\cdots+i^{10}$ and $i^{12}+i^{23}+i^{32}+i^{40}$	CO2	PO2
f.	Find the angle between two vector $(1,0,2)$ *to* $(3,1,2)$.	CO3	PO2
g.	Solve p+q=1	CO3	PO2
h.	Find the transform of the function $f(t) = 3Sin4t - 2Cos5t$.	CO3	PO2
i.	Show that $A = \begin{bmatrix} 2 & 3+4i \\ 3-4i & 2 \end{bmatrix}$ is Hermitian .	CO4	PO2
j.	Solve the following 2×2 system by using Cramer's rule $12x+3y=15$ *and* $2x-3y=13$	CO4	PO2

PART – C: (Long Answer Questions) **(10 x 4= 40 Marks)**

Answer ***ALL*** questions

	Question	CO #	PO #
3.a.	Prove by Truth table $p\wedge(q\vee r) \equiv (p\wedge q)\vee(p\wedge r)$	CO1	PO3
b.	$p\wedge q \equiv q\wedge p$ and $p\vee q \equiv q\vee p$ check by truth table.	CO1	PO2
	(OR)		
c.	If A={1,2,3,4,5} B={4,5,6,7,8} C={7,8,9,10,11} $U = \{1,2,3 \ldots .20\}$,then $A\cup B\cup C$,$A\cap (B\cup C)$, B-C , C-A ,$A\Delta C$.	CO1	PO3
d.	In a class of 100 students ,35 like Science and 45 like Mathematics.10 like both. How many students like either of them and how many student like neither of them ?	CO1	PO2
4.a.	Find the Divergence of $F=x^2\hat{i}+y^2\hat{j}+z^2\hat{k}$ and $F=x\hat{i}+y\hat{j}+z\hat{k}$	CO2	PO2
b.	Find the directional derivative of $F=x^2+y^2+z^2$ at a point $(5,6,7)$ in the direction of $\vec{a}$ $(1,1,1)$.	CO2	PO3
	(OR)		
c.	If $Z_1 = 3+6i$and $Z_2 = 6+3i$ then find Z_1+Z_2 , Z_1-Z_2 , $Z_1.Z_2$,$\frac{Z_1}{Z_2}$, $Z_1.\overline{z}_2$,	CO2	PO2
d.	Find the Modulous and argument or Convert into polar form Z=4+5i	CO2	PO2
5.a.	Solve $y^2zp + x^2zq = y^2x$	CO3	PO3
b.	Solve yz p+zx q=xy	CO3	PO3
	(OR)		
c.	Solve i) pq=1 ii) $p^2+q^2=m^2$	CO3	PO2
d.	Solve $i)$pq = p + q ii) pq + p + q = 0	CO3	PO3
6.a	Find the characteristics equation of matrix A=$\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$and verify that it is satisfied by A by Caley-Hamilton Theorm.	CO4	PO3
b.	Show that the Matrix A is Orthogonal $A = \begin{bmatrix} \cos\alpha & 0 & \sin\alpha \\ 0 & 1 & 0 \\ -\sin\alpha & 0 & \cos\alpha \end{bmatrix}$	CO4	PO3
	(OR)		
c.	Find the Laplace transform of the following i) 2Sin3t ii) Cosh6t iii) $e^{-2t}Sin2t$ iv) $e^{-7t}t^5$ v) $[e^{5t}Sin3t]$	CO4	PO3
d.	Find the Laplace transform of $L\left[e^t \frac{\sin t}{t}\right]$.	CO4	PO3

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