Reg. No.: | | | | | | | | | |

G.T.N. ARTS COLLEGE (AUTONOMOUS)

(Affiliated to Madurai Kamaraj University || Accredited with 'B' Grade by NAAC)

END SEMESTER EXAMINATION - APRIL - 2021

(UNDER OUTCOME BASED EDUCATION (OBE) PATTERN)

Programme : M.Sc. Physics | **Date : 21.06.2021**

Course Code : 20PPHC21 | **Time : 10:00 AM - 1:00 PM**

Course Title : Mathematical Physics - II | **Max. Marks : 100**

Q. No.	SECTION - A (20 * 1 = 20 Marks) Answer ALL Questions	CO(s)	K - Level
1.	In Taylor's series, when $z_0 = 0$, this series is called the _____ of f(z).	CO2	K1
	1.Liouville's theorem 2.Taylor Series 3.Maclaurin Series 4.Morera's theorem		
2.	The Cauchy Riemann equation provide a necessary condition for _____ at a point.	CO2	K1
	1.integral 2.differentiability 3.identical 4.holomorphic		
3.	If f(z) is analytic at all points inside a circular domain D with its center at $z=z_0$ and radius r_0 , then for every z inside D, This series is called the _____ series of f(z) with center at z_Θ .	CO2	K2
	1.Liouville's theorem 2.Taylor Series 3.Maclaurin Series 4.Morera's theorem		
4.	If a function f(z) is continuous in a simply connected domain D and if for every closed contour C in domain D, then f(z) is analytic throughout D.	CO1	K2
	1.Liouville's theorem 2.Taylor Series 3.Maclaurin Series 4.Morera's theorem		
5.	The residue theorem is used to evaluate contour integrals where the only singularities of f(z) inside the contour are _____.	CO2	K1
	1.residues 2.singular points 3.functions 4.poles		
6.	_____integrals are important is that certain probabilities can be represented by integrals that involve infinite limits	CO2	K1
	1.Residue 2.Converge 3.Diverge 4.Improper		
7.	If $f(z) = (1-e^z)/(1+e^z)$, then $z=\infty$, f(z) have _____	CO2	K2
	1.pole 2.removable singularity 3.isolated singularity 4.non isolated singularity		
8.	Using Cauchy's Residue Theorem, evaluate the integral of $f(z)=e^{-z} / (z-1)^3$ in the region $\|z\|=4$	CO2	K2
	1.$-2\pi i(1+e)$ 2.$\pi i / e$ 3.$-e/2\pi i$ 4.$2\pi i$		

9.	A _____ is a higher order generalization of a matrix.	CO4	K1
	1.fundamental 2.finite 3.symmetric 4.scalar		
10.	A tensor obtained by taking the inner product of a given tensor with the metric tensor, or by performing a series of such operations.	CO3	K1
	1.Fundamental 2.Finite 3.Associated 4.Scalar		
11.	A Kronecker symbol has ____ components.	CO4	K2
	1.Mixed 2.Single 3.Same 4.different		
12.	Kronecker tensor where components are the _____in every coordinate system.	CO3	K1
	1.different 2.same 3.zero 4.covariant		
13.	In group theory, a branch of abstract algebra, a character table is a two-dimensional table whose rows correspond to irreducible representations, and whose columns correspond to conjugacy classes of group elements.	CO5	K2
	1.Homomorphism 2.Character table 3.Endomorphism 4.Regular permutation		
14.	_____ is concerned with the elements of the matrices which constitute the IR of a group.	CO4	K2
	1.Semigroup 2.Subgroup 3.Orthogonality 4.Abelian group		
15.	A group _____ is a function between two groups that sets up a one-to-one correspondence between the elements of the groups in a way that respects the given group operations.	CO5	K1
	1.Homomorphism 2.Isomorphism 3.Endomorphism 4.Regular permutation		
16.	{1, i, -i, -1} is _____	CO4	K1
	1.Semigroup 2.Subgroup 3.cyclic group 4.abelian group		
17.	If two events (both with probability greater than 0) are mutually exclusive, then:	CO5	K1
	1.They also must be independent 2.They also could be independent. 3.They cannot be independent 4.both are same		
18.	According to the _____, as n grows large, the shape of the discrete distribution converges to the continuous Gaussian curve of the normal distribution.	CO5	K1
	1.Binomial probability 2.multinomial probability 3.De-Moivre limit theorem 4.compound event		
19.	In statistics and probability theory, two events are mutually exclusive if they cannot occur at the _____time.	CO5	K1
	1.different 2.zero		

	3.long	4.same		
20.	_____is a measure of the likelihood of an event to occur.		CO5	K1
	1.Sample space	2.Space		
	3.Probability	4.Event		

Q. No.	SECTION - B (5 * 6 = 30 Marks) Answer ALL Questions	CO(s)	K - Level
21. (a)	State and explain the necessary conditions for a function to be analytic.	CO1	K2
	[OR]		
(b)	Explain in detail the theorem of total probability.	CO5	K2
22. (a)	Explain the evaluation of improper real integrals.	CO2	K3
	[OR]		
(b)	Explain the evaluation of infinite integrals by Jordan's Lemma.	CO2	K3
23. (a)	Explain the Metric Tensor.	CO1	K3
	[OR]		
(b)	Explain Symmetric vector with an example.	CO1	K4
24. (a)	State and Explain Cayley's theorem.	CO2	K2
	[OR]		
(b)	What is a sub group? Explain the different types of sub group.	CO1	K2
25. (a)	Define compound event of compound probability.	CO1	K3
	[OR]		
(b)	Give an example for generalization theorem of probability.	CO1	K3

Q. No.	SECTION - C (5 * 10 = 50 Marks) Answer ALL Questions	CO(s)	K - Level
26. (a)	Define an analytic function of a complex variable.	CO1	K3
	[OR]		
(b)	Prove and explain Cauchy Integral formula in detail.	CO1	K2
27. (a)	Describe the evaluation of improper real integrals in detail.	CO1	K3
	[OR]		
(b)	Expound the evaluation of infinite integrals by Jordan's Lemma.	CO1	K3
28. (a)	Explain any three applications of tensors to Non-Relativistic physics.	CO1	K2
	[OR]		
(b)	Define and explain the below listed tensors Metric Tensor Invariant Tensor	CO3	K3
29. (a)	State and Explain the great Orthogonality theorem in detail.	CO4	K2
	[OR]		
(b)	Describe the symmetry group of Schrodinger equation.	CO4	K2
30. (a)	Describe the Binomial theorem of probability .	CO5	K3
	[OR]		
(b)	State and analyze Laplace-de Moivre limit theorem.	CO3	K3

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