# Model Question G.E.-3 Mathematics

# Multiple Choice Questions

# A ………… is an ordered collection of objects.

#  a) Relation b) Function c) Set D) Proposition

# If $A∩B^{c}=φ $then

# a) A=B

#  b) B$\ne A$

#  c) A is proper subset of B

#  d) None

# Which of the following is generalized distribution law

# a)$B∩(\bigcup\_{i\in I}^{}A\_{i})=\bigcup\_{i\in I}^{}\left(B∩A\_{i}\right)$

# b) $B∪(\bigcup\_{i\in I}^{}A\_{i})=\bigcup\_{i\in I}^{}\left(B∩A\_{i}\right)$

# c) $\bigcup\_{i\in I}^{}\left(A\_{i}∪B\_{i}\right)=(\bigcup\_{i\in I}^{}A\_{i})∪(\bigcup\_{i\in I}^{}B\_{i})$

# If $f:X\rightarrow Y, A⊆X, B⊆X $then

# a) $f\left(A∪B\right)=f\left(A\right)∪f\left(B\right)$

# b)$f\left(A∪B\right)=f\left(A\right)∩f\left(B\right)$

# c)$f\left(A∩B\right)=f\left(A\right)∩f\left(B\right)$

# d)$f\left(A∪B\right)\ne f\left(A\right)∪f\left(B\right)$

# If $A\_{1}=\left\{1,10,11\right\}, A\_{2}=\left\{2,4,6,8\right\}, A\_{3}=\left\{5,7\right\}, A\_{4=}\left\{2,5,7\right\}, A\_{5}=\left\{2,4,5\right\} and I=\left\{2,3,5\right\} then \bigcup\_{i\in I}^{}A\_{i} is equal to$

# a) {2,4,6,8,5,7}

# b) {2}

# c) $φ$

# d) {1,2,5}

# Find the false statement “If $R and R^{'}$ be two relations on A then

# a) $R∪R^{'}$ is reflexive.

# b) $R∪R^{'}$ is symmetric.

# c) $R∩R^{'}$ is transitive.

# d) $R∪R^{'}$ is transitive.

# What is the order of the differential equation $\frac{dy}{dx}+4y=sinx$

# a) 0.5

# b) 1

# c) 2

# d) 0

# What is the degree of the differential equation

#  $\left(\frac{dy}{dx}\right)^{2}-10\frac{dy}{dx}+2y=0$

# a) 0

# b) 1

# c) 2

# d) 3

# Which of these differential equation is not in the Clairaut’s form

# a) $y=px+p^{2}$

# b) $y=px+logp$

# c) $y=px+\frac{a}{p}$

# d) $p^{2}+2xp-3x^{2}=0$

# The integrating factor of the differential equation

#  $\left(x+y+1\right)\frac{dy}{dx}=1$ is

# a) $e^{y}$

# b)$e^{-y}$

# c) 2

# d) 1

# Which of the following statements is false

# a) If a function f is not defined at x=a then it is not continuous at x=a.

# b) All polynomial functions are continuous.

# c) Product of two continuous functions is continuous.

# d) If f is continuous the $| f |$ is not continuous.

# $\lim\_{x\to -2}\frac{\sqrt{x^{2}+5}-3}{x+2}$ is equal to

# a) 0

# b) $\frac{2}{3}$

# c) $\frac{-2}{3}$

# d) none

# The function $f\left(x\right)=\left|x\right| at x=0$ is

# a) continuous and differentiable

# b) continuous but not differentiable.

# c) not continuous but differentiable.

# d) neither continuous nor differentiable.

# If f and g are continuous on [a,b] and have equal finite derivatives in [a,b] then f-g

# a) constant

# b) f/g

# c) g

# d) $\infty $

# What is the value of c if the function $f\left(x\right)=-x^{2}+6x-6 for 1\leq x\leq 5 $is continuous and differentiable over [1,5]

# a) 3

# b) 1

# c) 4

# d) 2

# A group ( G, \*) is said to be abelian if

# a) $x+y=y+x$

# b) $x+y=x$

# c) $x\*y=y\*x$

# d) $y\*x=x+y$

# $\left\{1,i,-i,-1\right\}$ is a

# a) Semigroup

# b) Cyclic group

# c) Subgroup

# d) Abelian group

# A cyclic group is always

# a) Abelian group

# b) Semigroup

# c) monoid

# d) subgroup

# The multiplicative identity of natural nos. is

# a) 0

# b) -1

# c) 1

# d) 2

# If a function $f(x,y)$ is differentiable at a point (a,b) then

# a) $f\_{x} and f\_{y} $may or may not exist.

# b) $f\_{x} and f\_{y} $both exist.

# c) only one of $f\_{x} and f\_{y}$ exist.

# d) $f\_{x} and f\_{y}$ both does not exist.

# The function f should be ………. On [a,b] according to Rolle’s theorem

# a) continuous

# b) non-continuous

# c) integral

# d) non- existent

# The function f is differentiable on (a,b) according to Rolle’s theorem

# a) True

# b) False

# A subgroup has the properties of

# a) closure, associative

# b) commutative, associative, closure

# c) inverse, identity, associative

# d) closure, associative, identity, inverse.

# Short Answer type questions

# Define union and intersection for an indexed family of sets.

# If $f:X\rightarrow Y and \{A\_{i}\}\_{i\in I}$ be an indexed family of subsets of X then prove that

# a) $f(\bigcup\_{i\in I}^{}A\_{i})=\bigcup\_{i\in I}^{}f\left(A\_{i}\right)$

# b) $f(\bigcap\_{i\in I}^{}A\_{i})⊆\bigcap\_{i\in I}^{}f(A\_{i})$

# Define an equivalence relation on a set giving an example.

# Write Cauchy’s definition of continuity.

# Define Group and subgroup.

# Define order of a group and cyclic group.

# Define homomorphism.

# Define simultaneous limit and repeated limits.

# Evaluate $log\_{\left(x,y\right)\rightarrow (0,0)}\left[\frac{xy}{\sqrt{x^{2}+y^{2}}}\right]$

# Solve $p^{2}+2xp-3x^{2}=0$

# Solve $\left(y+1\right)p-xp^{2}+2=0$

# Long answer type questions

# State and prove De-Morgan’s law.

# State and prove fundamental theorem on equivalence relation.

# State and Prove Rolle’s theorem.

# Prove that continuity is necessary but not sufficient condition for the existence of a finite derivative.

# Discuss the continuity of the function at $x=0, f\left(x\right)=\frac{1}{1-e^{\frac{1}{x}}},x\ne 0$

# Prove that the order of any subgroup of a finite group divides the order of the group.

# Prove that a non-void subset H of a group G is a subgroup of G if and only if $a,b\in H⟹ab^{-1}\in H$

# Solve $y=2px+p^{2}$

# Solve $y=\left(1+p\right)x+ap^{2}$

# Let $f\left(x,y\right)=\frac{x^{2}y}{x^{4}+y^{2}}, for x\ne 0,y\ne 0 ,f\left(0,0\right)=0$ .Show that the partial derivatives $f\_{x} ,f\_{y}$ exist everywhere in the region $-1\leq x\leq 1, -1\leq y\leq 1$, although $f(x,y)$ is discontinuous at (0,0).