University of Mumbai
Examination 2021

Examinations Commencing from 10th April 2021 to 17th April 2021

Program: **Information Technology**

Curriculum Scheme: Rev2019

Examination: SE Semester III (DSE)

Course Code: ITC305 and Course Name: Paradigms and Computer Programming Fundamentals

Time: 2 hour Max. Marks: 80

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which is **NOT** a correct syntax for a type signature for a haskell binary function named "**foo"** ?
Option A:	foo :: a-> a-> a
Option B:	foo :: Num a => a -> a -> a
Option C:	foo :: Num a => (b->a) -> a ->a
Option D:	foo :: Num a => b ->a -> a -> a
2.	Image 1 shows contents of two distinct prolog codes KB-1 and KB-2 Which of the following statements is **true** about the above two KBs KB-1: edge(a,b). edge(b,c). path(X, X). path(X, Y) :- edge(Z, Y), path(X, Z). KB-2: edge(a,b). edge(b,c). path(X, Y) :- edge(Z, Y), path(X, Z). path(X, X). Image 1
Option A:	Query path(a,a) will evaluate as true for both KBs
Option B:	Query path(a,a) will evaluate as false for both KBs

Option C:	Query path(a,a) will evaluate as true for KB-1 and false in KB-2
Option D:	Query path(a,a) will evaluate as true for KB-1 and will not terminate in KB-2
3.	When parameters are passed to a subroutine while calling it , are known as _____
Option A:	Formal parameters
Option B:	Normal parameters
Option C:	Actual parameters
Option D:	Additional parameters
4.	Consider a list a=[1, 2, 3, 4, 5, 6, 7, 8, 9, 10] is available in Haskell's interactive environment. If we execute following statement at prelude prompt what will be the output: let (y,z) = splitAt 1 a in y ++ (tail z)
Option A:	[1,2,3,4,5,6,7,8,9,10]
Option B:	[1,1,3,4,5,6,7,8,9,10]
Option C:	[1,3,4,5,6,7,8,9,10]
Option D:	[1,1,2,3,4,5,6,7,8,9,10]
5.	Image 2 shows a prolog code that performs some arithmetic operations. What will be the output, if we pose queries **calculate(F, 5)** and **calculate(5,5)** separately to the prolog interpreter based on this code? calculate(0,0). calculate(1,1). calculate(F,N) :- N>1, N1 is N-1, N2 is N-2, calculate(F1,N1), calculate(F2,N2), F is F1+F2. Image 2
Option A:	false and 5
Option B:	F=3 and true

Option C:	F=5 and true
Option D:	F=3 and false
6.	Which is the incorrect query in Prolog from the following?
Option A:	?- is(X, 1+2).
Option B:	?- X is 1+2.
Option C:	?- 1+2 is 4-1.
Option D:	?- is(1+2,X).
7.	Compiler translates high level language source code into _____
Option A:	corrected code
Option B:	object code
Option C:	pre code
Option D:	document code
8.	From the following statements, which is **not** true about Coroutines?
Option A:	Coroutines are execution contexts.
Option B:	Coroutines can not share a single stack.
Option C:	Coroutines can not be used to implement iterators.
Option D:	Coroutines can be used to implement threads.
9.	Which of the following is incorrect about Haskell
Option A:	It follows declarative style of programming
Option B:	Adopts principles of lambda calculus
Option C:	Store the state of the function in the form of variables
Option D:	Includes only pure functions
10.	Which of the following is true about polymorphism in Haskell?
Option A:	type variables in haskell is an instance of parametric polymorphism whereas type

	classes in haskell is an instance of ad-hoc polymorphism.
Option B:	type variables in haskell is an instance of ad-hoc polymorphism whereas type classes in haskell is an instance of parametric polymorphism.
Option C:	type variables and type classes in haskell are instances of parametric polymorphism.
Option D:	type variables and type classes in haskell are instances of ad-hoc polymorphism.
11.	Which of the following commands tells the Prolog system to fail a particular goal immediately without trying for alternate solutions.
Option A:	not
Option B:	cut
Option C:	unify
Option D:	disjunction
12.	Which of the following is **NOT** a Type class in Haskell.
Option A:	Bounded
Option B:	Functor
Option C:	Integral
Option D:	String
13.	Which of the following is true for Implicit parametric polymorphism
Option A:	Parameter types are not specified at all and not type-safe
Option B:	Parameter types to be specified explicitly, but still type-safe
Option C:	Parameter types are incompletely specified and not type-safe
Option D:	Parameter types are incompletely specified, but still type-safe
14.	From the following, which can not be considered as variable in Prolog?
Option A:	A

Option B:	_h
Option C:	What
Option D:	x
15.	Which of the following is used in logic programming?
Option A:	classes
Option B:	resolution and unification
Option C:	monad
Option D:	iterative constructs
16.	When binding of the referencing environment of a subroutine that has been passed as a parameter, occurs late then it is known as ___ and which is usually default in languages with _____.
Option A:	Shallow binding, dynamic scoping
Option B:	Shallow binding, static scoping
Option C:	deep binding, dynamic scoping
Option D:	deep binding, static scoping
17.	The period of time between the creation and the destruction of a name-to object binding is referred as
Option A:	binding lifetime
Option B:	object lifetime
Option C:	runtime lifetime
Option D:	referencing
18.	Which of the programming language DOES NOT belongs to declarative programming paradigm
Option A:	XML

Option B:	SQL
Option C:	prolog
Option D:	java
19.	Choose the most appropriate feature of the functional programming used in the Haskell code shown in image 4: relate :: (c -> d) -> [c] -> [d] relate _ [] = [] relate f (x:xs) = f x : relate f xs Image 4
Option A:	Polymorphism
Option B:	Higher order function
Option C:	Aggregates for structured objects
Option D:	Garbage Collection
20.	Maintenance of the stack is done by _____.
Option A:	Subroutine calling sequence / Subroutine frames
Option B:	Prologue2 / Subroutine local variables
Option C:	Epilogue / Subroutine return values
Option D:	Subroutine calling sequence, Prologue and Epilogue

Q2.	**Solve any Four out of Six** **5 marks each**
A	Explain how Prolog differs from imperative languages in its handling of arithmetic.
B	Justify the following statement, "No single factor determines whether a programming language is good."
C	Explain concept of currying in haskell with an example.
D	Explain what are facts, rules, and queries in logic programming with example.

E	The haskell function head defined in prelude, returns the first element of a list and throws an exception when we try to apply it on an empty list. Define two variants of this function (you can use different names) that work exactly like head function except in the case of an empty list input they will show [] as output instead of throwing an exception. You must use the following constructs in Haskell for defining the functions. a. First implementation should make use of pattern matching. b. Second implementation uses guard equations **Note: Students are not expected to write the main function and do uer IO.**
F	Describe different parameter passing modes.
Q3.	**Solve any Four out of Six** **5 marks each**
A	Compare heap based and stack based principle storage allocation mechanisms.
B	Write a note on Lambda Calculus.
C	What is the difference between normal-order and applicative-order evaluation? What is lazy evaluation?
D	Describe the difference between forward chaining and backward chaining. Which is used in Prolog by default?
E	Define a haskell function named “addUs” that adds 2 input numbers. Using this function as a building block, define a Haskell function “multiplyUs” that multiplies two input numbers. The multiplyUs function should cater to following: 1. Inputs may be signed numbers e.g. “multiplyUs (-2) * (3)” should result in “-6” and “multiplyUs (-2) * (-6)” should result in “12” 2. It should use guard expressions and recursion. 3. No need to write the main function to do user interaction writing definition for “addUs” and “multiplyUs” is sufficient.
F	Discuss Scope with reference to binding in program. Also compare static and dynamic scoping.

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	D
Q2.	A
Q3.	C
Q4	C
Q5	C
Q6	D
Q7	B
Q8.	C
Q9.	C
Q10.	A
Q11.	B
Q12.	D
Q13.	D
Q14.	D
Q15.	B
Q16.	A
Q17.	A
Q18.	D
Q19.	B
Q20.	D