

University of Mumbai
Examination 2021 under cluster 7 (Lead College: SSJCOE)

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.	<p>Image 1 shows contents of two distinct prolog codes KB-1 and KB-2</p> <p>Which of the following statements is true about the above two KBs</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"><p>KB-1: edge(a,b). edge(b,c). path(X, X). path(X, Y) :- edge(Z, Y), path(X, Z).</p><p>KB-2: edge(a,b). edge(b,c). path(X, Y) :- edge(Z, Y), path(X, Z). path(X, X).</p></div> <p style="text-align: center;">Image 1</p>
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? <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <pre> 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. </pre> <p>Image 2</p> </div>
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.	<p>Choose the most appropriate feature of the functional programming used in the Haskell code shown in image 4:</p> <pre> relate :: (c -> d) -> [c] -> [d] relate _ [] = [] relate f (x:xs) = f x : relate f xs </pre> <p style="text-align: right;">Image 4</p>
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.	<p>Solve any Four out of Six</p> <p style="text-align: right;">5 marks each</p>
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	<p>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.</p> <p>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.</p> <p>You must use the following constructs in Haskell for defining the functions.</p> <ol style="list-style-type: none"> First implementation should make use of pattern matching. Second implementation uses guard equations <p>Note: Students are not expected to write the main function and do uer IO.</p>
F	Describe different parameter passing modes.
Q3.	<p>Solve any Four out of Six</p> <p>5 marks each</p>
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	<p>Define a haskell function named “addUs” that adds 2 input numbers.</p> <p>Using this function as a building block, define a Haskell function “multiplyUs” that multiplies two input numbers.</p> <p>The multiplyUs function should cater to following:</p> <ol style="list-style-type: none"> Inputs may be signed numbers e.g. “multiplyUs (-2) * (3)” should result in “-6” and “multiplyUs (-2) * (-6)” should result in “12” It should use guard expressions and recursion. 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.