Model Question Paper

ADMISSION TEST -- Postgraduate Programme

M.Sc. (Mathematics)

Time: 2 Hours **Max. Marks : 75**

SAMPLE QUESTIONS

PART A

Multiple Choice Items. Each question carries ONE mark. 50 Questions.

MODEL QUESTIONS given below:

1) The formula for Arc length of a curve is given by

$a)\ \sqrt{1+\left(\frac{dy}{dx}\right)^2}\,dx$ b) $\sqrt{1+\left(\frac{dy}{dx}\right)^2}\,dy$

c) $\sqrt{1+\left(\frac{dy}{dx}\right)^2}\,dydx$ d) $\sqrt{1+\left(\frac{dy}{dx}\right)^2}\,dxdy$ e) $\sqrt{1-\left(\frac{dy}{dx}\right)^2}\,dxdy$

2) A) Every continuous function is differentiable.
B) Every differentiable function is continuous.

$a)$ Statement A is true and Statement B is false
a) Statement A is false and Statement B is true
b) Statement A is false and Statement B is false
c) Statement A is true and Statement B is true
d) Statement A is true and sometimes Statement B is true

3) If $f(z) = \frac{1}{(z-1)(z+1)^2}$, then what is $Res\,(f,-1)$:

(a) $\frac{-1}{8}$ (b) $\frac{-1}{4}$ (c) $\frac{1}{4}$ (d) 0 (e) $\frac{1}{2}$

4) Let T be a tree, suppose that T has r vertices and s edges. Then which of the following is true.

a. s = r – 1
b. r = s – 1
c. r = s
d. s = r/2
e. r=s/2

5) The necessary and sufficient condition for a graph to contain an Euler circuit is

a. Every vertex must have a odd degree
b. Every vertex must have a even degree
c. Graph must be connected
d. Graph must be connected and every vertex must have an odd degree
e. Graph must be connected and every vertex must have an even degree

6) Which one of the following is true about the solution of the following initial value problem

$y' = y^{-2}(2-3x)\,, \quad y(0) = 19$:

A) Non-existent B) Trivial C) Infinite D) Unique
E) Vacuous

7) Identify the following statements as TT,TF,FT,FF:
a) If Wronskian of 2 functions is zero, then functions are linearly dependent.
b) If 2 functions are linearly independent, then their Wronskian is zero.
A) TT B) TF C) FT D) FF
E) Data insufficient

8) The number of proper subgroups of a group of order 11 is
A) 1 B) 0 C) 3 d) 10 e) 11

9) The characteristic of ring of real numbers is
A) 0 B) 1 C) 2 D) prime number

10) If R is a ring such that $a^2 = a \;\; \forall\, a \in R$, then R is
A) Integral domain B) commutative Ring

C) non-commutative ring D) Field E) None of the above

11) The iteration formula for Newton Method for finding root of f(x) =0 is:
a) $X_{n+1} = x_n - [f(x_n)/f'(x_n)]$
b) $X_{n+1} = x_n - [f'(x_n)/f(x_n)]$
c) $X_{n+1} = x_n + [f(x_n)/f'(x_n)]$
d) $X_{n+1} = f'(x_n) - [x_n/f(x_n)]$
e) $X_{n+1} = f''(x_n) - [x_n/f(x_n)]$

12) Which one of the following is NOT a property of matrices?

a) $|AB| = |A|\,|B|$
b) $(AB)^{-1} = B^{-1}A^{-1}$
c) $(AB)^{T} = A^{T}B^{T}$
d) $(A^{T})^{-1} = (A^{-1})^{T}$
e) None of the above

13) If X is an exponential random variable with parameter $\lambda = 10$, then it's variance is

(A) $\frac{1}{10}$ (B) $\frac{1}{50}$ (C) $\frac{1}{100}$ (D) $\frac{9}{100}$ (E) $\frac{1}{2}$

14) If the probability density function for a continuous random variable is given by $f(x) = \begin{cases} 1 & 0 \le x \le 1 \\ 0 & otherwise \end{cases}$, then $E[e^X]$ is

(A) e (B) e^2 (C) 1 (D) $e-1$ (E) $e+1$

15) Which one of the following is a linear transformation?

a. $T:R \rightarrow R^2$ э $T(x)=(1, -1)$
b. $T:R^2 \rightarrow R^2$ э $T(x,y)=(x^2, y^2)$
c. $T:R^2 \rightarrow R^3$ э $T(x,y)=(xy, y, x)$
d. $T: R^2 \rightarrow R^3$ э $T(x,y)=(x+y, y, x)$
e. $T:R^2 \rightarrow R^3$ э $T(x,y)=(x+1, y, x)$

PART B

Answer Each question carries FIVE marks.

1) Discuss the zeroes and singularities of the function $\frac{(z^2-1)(z-2)^3}{(\sin \pi z)^3}$
2) Prove that every finite partial ordered set has at least one maximal element and at least one minimal element.
3) Prove that an abelian group of order 21 is cyclic.
4) A batch of 100 items contains 6 that are defective and 94 items that are non-defective If X is the number of defective items in a randomly drawn sample of 10 items from the batch , find (a) $P\{X = 0\}$ (b) $P\{X > 2\}$ using Poisson distribution .

PART C

(C-Programming Questions) Each question carries TWO marks.

1. Write a function to print the sum of cubes of first 1000 natural numbers in 2 - different ways once using for loop and another using do-while loop.
2. Malloc and Calloc return void pointer. What is void pointer? Illustrate it with example? Do we need explicit typecasting to and from void pointer.

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