MCQ-Question bank

UNIT-1

LOGICS

1.	Let p be the proposition "It is sunny this afternoon" and q be the proposition "We will go swimming", Which of the following is the symbolic form the statement "We will go swimming only if it is sunny this afternoon".			
	A)	$p \longrightarrow q$	B)	$q \longrightarrow p$
	C)	$p \vee q$	D)	$p \wedge q$
2.	The conclusion of the hypothesis "If George does not have eight legs, then he is not an insect" and "George is an insect" is			
	A)	George does not have eight legs	B)	George is not an insect
	C)	George has eight legs	D)	Can't conclude anything from the given hypothesis
3.	Contrapositive statement of the statement $\neg p \rightarrow \neg q$ is:			
	A)	$\neg p \longrightarrow \neg q$	B)	$p \rightarrow q$
	C)	$\neg q \longrightarrow p$	D)	$q \rightarrow p$
4.	In proving √5 as irrational, we begin with assumption √5 is rational in which type of proof?			
	A)	Direct proof	B)	Proof by Contradiction
	C)	Mathematical Induction	D)	Not Indirect Proof
5.	If P(k) = k^2 (k + 3) (k^2 – 1) is true, then what is P(k + 1)?			
	A)	$(k + 1)^2$ (k + 3) (k^2 – 1)	B)	$(k + 1)^2$ (k + 4) (k^2 – 1)
	C)	$(k + 1)^2$ (k + 4) k (k + 2)	D)	(k + 1) (k + 4) k (k +2)
6.	Which of the following statement is logically equivalent to the statement $(\sim p \vee q)$			
	A)	$(p \wedge q)$	B)	$(p \rightarrow q)$
	C)	$(\sim p \wedge q)$	D)	$(p \vee \sim q)$
7.	Which rule of inference is used in this argument "If it hails today, then local office will be closed. The local office is not closed today. Thus, it did not hail today".			
	A)	Simplification	B)	Modus tollens
	C)	Hypothetical Syllogism	D)	Conjunction
8.	Inverse of the statement $p \longrightarrow \sim q$ is:			
	A)	$p \longrightarrow q$	B)	$\sim p \longrightarrow q$
	C)	$q \longrightarrow \sim p$	D)	$\sim p \longrightarrow \sim q$
9.	The logical consequence of the statement $(p \vee q) \wedge \sim q$ is:			
	A)	q	B)	p
	C)	$\sim q$	D)	$\sim p$
10.	Which of the following statement is logically equivalent to the statement $\sim(\sim p \wedge \sim q)$			
	A)	$p \wedge q$	B)	$\sim(p \vee q)$
	C)	$\sim(p \wedge q)$	D)	$p \vee q$
11.	If $P(n)$: $(1 + n^2) < 2^n$, then for which least positive integer the statement $P(n)$ is true?			
	A)	3	B)	4
	C)	5	D)	6
12.	Which of the following is not a Rule of inference?			
	A)	$[p \wedge (p \longrightarrow q)] \longrightarrow q$	B)	$[(p \longrightarrow q) \wedge \sim p] \longrightarrow \sim q$
	C)	$[(p \longrightarrow q) \wedge (q \longrightarrow r)] \longrightarrow (p \longrightarrow r)$	D)	$[(p \longrightarrow q) \wedge q] \longrightarrow p$

UNIT-II

SET THEORY

1.	Which of the following statement is not correct?			
	A) A reflexive relation has a cycle of length one at every vertex.		B)	The matrix of reflexive relation must have all 1's in its main diagonal.
	C) If R is reflexive relation on A, then $Domain(R) = Range(R) = A$.		D)	The matrix of reflexive relation must have all 0's in its main diagonal.
2.	If p = (2,3,4,7) is a permutation of the set A = {1,2,3,4,5,6,7,8} then p^{-1} is:			
	A)	(4,7,2,3)	B)	(7,4,3,2)
	C)	(7,4,2,3)	D)	(3,4,7,2)
3.	The complete graph with eight vertices has………..edges.			
	A)	64	B)	24
	C)	28	D)	36
4.	A simple graph can have			
	A)	multiple edges	B)	self loops
	C)	parallel edges	D)	no multiple edges, self loops and parallel edges
5.	Let $A = \{1,2,3,4,5,6\}$ and R be the relation on A, defined by aRb if and only if $a < b$, then R is:			
	A)	Symmetric relation	B)	Reflexive
	C)	Equivalence	D)	Transitive relation
6.	If $A = \{1,2,3\}$ and $p = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$ then $p^{-1} =$ _______			
	A)	$\begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$	B)	$\begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \end{pmatrix}$
	C)	$\begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix}$	D)	$\begin{pmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \end{pmatrix}$
7.	If a graph G has 7 vertices whose degrees are 2, 4, 6, 5, 7, 8, 10, then number of edges in graph G is:			
	A)	12	B)	84
	C)	42	D)	21
8.	Which of the following can have loops and multiple edges ?			
	A)	Simple graphs	B)	multi graphs
	C)	Both A and B	D)	Neither of A and B.
9.	Let $A = \{1,2,3,4,5,6\}$ and R be the relation on A, defined by aRb if and only if $a < b$, then R is:			
	A)	Reflexive relation	B)	Symmetric relation
	C)	Transitive relation	D)	Equivalence relation
10.	If $A = \{1,2,3\}$ and $p = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix}$ then p^{-1} *is*			
	A)	$\begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$	B)	$\begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix}$
	C)	$\begin{pmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \end{pmatrix}$	D)	$\begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \end{pmatrix}$
11.	If a graph G has 7 vertices whose degrees are 2, 4, 6, 5, 7, 8, 10, then number of edges in graph G is:			
	A)	21	B)	12
	C)	42	D)	84
12.	The degree of a pendant vertex is :			
	A)	0	B)	1
	C)	2	D)	3

UNIT-III

NUMERICAL METHODS

1.	The Newton- Raphson formula to find the $(n+1)^{th}$ approximation to the root of $f(x) = 0$ is :			
	A)	$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$	B)	$x_{n+1} = x_n + \frac{f(x_n)}{f'(x_n)}$
	C)	$x_{n+1} = x_n - \frac{f'(x_n)}{f(x_n)}$	D)	$x_{n+1} = x_n - \frac{f'(x_n)}{f''(x_n)}$
2.	The first approximation to a real root of the equation $x^3 - 2x^2 - 2 = 0$ in (2,3) by Regula-Falsi method is			
	A)	2.95	B)	2.22
	C)	2.56	D)	2.09
3.	For the heat equation $u_t = 0.5u_{xx}$, $h = k = 1$, the value of mesh ratio parameter α is ……….			
	A)	1	B)	0.5
	C)	0.25	D)	2
4.	The Fourier series expansion of x^3 in the interval $-1 \leq x \leq 1$, periodic with $f(x+2) = f(x)$ has:			
	A)	Only Sine terms	B)	Only Cosine terms
	C)	Both Sine and Cosine terms	D)	Only Sine terms and a non-zero constant
5.	The method which approximates curve as tangent to find root of an algebraic equation is:			
	A)	Newton-Raphson method	B)	Regula-Falsi method
	C)	Runge-Kutta method	D)	Modified Euler's method
6.	The Modified Euler's iteration formula to find better approximation of y_1 of the first order ordinary differential equation is:			
	A)	$y_1^{(n+1)} = y_0 - \frac{h}{2}[f(x_0, y_0) + f(x_1, y_1^{(n)})]$	B)	$y_1^{(n+1)} = y_0 + h[f(x_0, y_0) + f(x_1, y_1^{(n)})]$
	C)	$y_1^{(n+1)} = y_0 + [f(x_0, y_0) + f(x_1, y_1^{(n)})]$	D)	$y_1^{(n+1)} = y_0 + \frac{h}{2}[f(x_0, y_0) + f(x_1, y_1^{(n)})]$
7.	Using Euler's method for the initial value problem $\frac{dy}{dx} = 2xy$, $y(0) = 1$, $h = 0.1$, the value of y_1 is___________			
	A)	0	B)	2
	C)	1.02	D)	1
8.	In Runge – Kutta method of order four, the formula for k_1 = __________________			
	A)	$y_0 + hf(x_0, y_0)$	B)	$hf(x_0, y_0)$
	C)	$hf(x_0 + \frac{h}{2}, y_0)$	D)	$hf(x_0 + \frac{h}{2}, \frac{y_0}{2})$
9.	For the heat equation $2u_t = u_{xx}$, h = k = 1, the value of mesh ratio parameter α is ___________			
	A)	1	B)	0.25
	C)	0.5	D)	2
10.	A root of the equation $f(x) = 0$ lies in the interval [a,b] if,			
	A)	$f(a)f(b) > 0$	B)	$f(a)f(b) < 0$
	C)	$f(a) = f(b)$	D)	$f(a)f(b) = 0$
11.	The root of the equation $x^2 - 12 = 0$ lies in the interval			
	A)	[3,4]	B)	[4,5]
	C)	[2,3]	D)	[1,2]
12.	The average slope concept for solving a first order ODE is used in :			
	A)	Taylor's series method	B)	Euler's method
	C)	Modified Euler's Method	D)	Newton Raphson method

13.	The Taylor's series formula to find y_1 for the first order ODE $y' = f(x, y)$ for given h is:			
	A)	$y_1 = y_0 - \frac{h}{1!}y_0' + \frac{h^2}{2!}y_0'' - \frac{h^3}{3!}y_0''' + \cdots$	B)	$y_1 = \frac{h}{1!}y_0' + \frac{h^2}{2!}y_0'' + \frac{h^3}{3!}y_0''' + \cdots$
	C)	$y_1 = y_0 + \frac{h}{1!}y_0' + \frac{h^2}{2!}y_0'' + \frac{h^3}{3!}y_0''' + \cdots$	D)	$y_1 = \frac{h}{1!}y_0' - \frac{h^2}{2!}y_0'' + \frac{h^3}{3!}y_0''' + \cdots$
14.	The forward difference approximation for $\frac{\partial u}{\partial x}$ is:			
	A)	$\frac{u_{i,j}-u_{i-1,j}}{h} + O(h)$	B)	$\frac{u_{i+1,j}-u_{i,j}}{h} + O(h)$
	C)	$\frac{u_{i+1,j}-u_{i-1,j}}{2h} + O(h^2)$	D)	$\frac{u_{i-1,j}-2u_{i,j}+u_{i+1,j}}{h^2} + O(h^2)$

UNIT-IV

FOURIER ANALYSIS

1.	What is the Fourier series expansion of the function $f(x)$ in the interval $(\alpha, \alpha + 2L)$?			
	A)	$\frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos(nx) + \sum_{n=1}^{\infty} b_n \sin(nx)$	B)	$\frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos\left(\frac{n\pi x}{L}\right) + \sum_{n=1}^{\infty} b_n \sin\left(\frac{n\pi x}{L}\right)$
	C)	$\frac{a_0}{2} + \sum_{n=0}^{\infty} a_n \cos\left(\frac{n\pi x}{L}\right) + \sum_{n=0}^{\infty} b_n \sin\left(\frac{n\pi x}{L}\right)$	D)	$a_0 + \sum_{n=0}^{\infty} a_n \cos(nx) + \sum_{n=0}^{\infty} b_n \sin(nx)$
2.	Which of the following functions is odd			
	A)	$-x - x^3$	B)	$\sin x^2 + x^5$
	C)	$\cos 5x + 3e^{-x}$	D)	$e^{-x} + e^x$
3.	Fourier transform of the function $f(t)$ = ...			
	A)	$\int_{-\infty}^{\infty} f(t)e^{-\omega t}dt$	B)	$\int_{0}^{\infty} f(t)e^{-i\omega t}dt$
	C)	$\int_{-\infty}^{\infty} f(t)e^{-i\omega t}dt$	D)	$\int_{0}^{\infty} f(t)e^{-\omega t}dt$
4.	What is the Fourier series expansion of the function $f(x)$ in the interval $(c, c + 2\pi)$			
	A)	$\frac{a_0}{2} + \sum_{n=0}^{\infty} a_n \cos(nx) + \sum_{n=0}^{\infty} b_n \sin(nx)$	B)	$\sum_{n=1}^{\infty} a_n \cos(nx) + \sum_{n=1}^{\infty} b_n \sin(nx)$
	C)	$1 + \sum_{n=0}^{\infty} a_n \cos(nx) + \sum_{n=0}^{\infty} b_n \sin(nx)$	D)	$\frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos(nx) + \sum_{n=1}^{\infty} b_n \sin(nx)$
5.	If the function $f(x)$ is even, then which of the following is zero in the Fourier series expansion of $f(x)$?			
	A)	a_n	B)	b_n
	C)	a_0	D)	None of these
6.	The Fourier series expansion of an odd periodic function contains only______			
	A)	Sine terms	B)	Constant term

	C)	Cosine terms	D)	Both sine term and cosine terms
7.	Which of the following is the Analysis equation of Fourier Transform?			
	A)	$F(w) = \int_{-\infty}^{\infty} f(t)e^{jwt}dt$	B)	$F(w) = \int_{-\infty}^{\infty} f(t)e^{-jwt}dt$
	C)	$F(w) = \int_{0}^{\infty} f(t)e^{jwt}dt$	D)	$F(w) = \int_{0}^{\infty} f(t)e^{-jwt}dt$
8.	If $f(x)$ is defined in $(-\pi,\pi)$, then the Fourier coefficient a_0 is			
	A)	$\int_0^{2\pi} f(x)\ dx$	B)	$\frac{1}{\pi}\int_{-\pi}^{\pi} f(x)\ dx$
	C)	$\frac{1}{\pi}\int_{-\pi}^{\pi} f(x)\cos nx\, dx$	D)	$\frac{1}{\pi}\int_{-\pi}^{\pi} f(x)\sin nx\ dx$
9.	The Fourier series expansion of an odd periodic function contains			
	A)	Only cosine terms	B)	Only constant term
	C)	Only sine terms	D)	Both constant and cosine terms
10.	The Fourier series expansion of an odd periodic function contains:			
	A)	Cosine terms only	B)	Constant and Cosine terms only
	C)	Sine terms only	D)	Constant term and sine terms only
11.	The constant term in the Fourier series for the function $f(x) = x^2 - 2$ in $(-2,2)$ is :			
	A)	$4/3$	B)	$-4/5$
	C)	$2/3$	D)	$-2/3$
12.	The term b_n in the half range Fourier Sine expansion $f(x)$ defined in $(0,\pi)$ is :			
	A)	$\frac{2}{\pi}\int_0^{\pi} f(x)\sin nx\, dx$	B)	$\frac{1}{\pi}\int_0^{\pi} f(x)\cos nx\, dx$
	C)	$\frac{1}{\pi}\int_0^{\pi} f(x)\sin nx\, dx$	D)	$\frac{2}{\pi}\int_0^{\pi} f(x)\cos nx\, dx$
13.	If $F(x(t)) = X(\omega)$, is the Fourier transform of the function $x(t)$, then $F(x(t-a)) =$			
	A)	$e^{-ia\omega}X(\omega)$	B)	$e^{-ia\omega}X(a\omega)$
	C)	$e^{ia\omega}X(a\omega)$	D)	$\frac{e^{-ia\omega}}{X(\omega)}$
14.	The Fourier series expansion of x^3 in the interval $-1 \le x \le 1$, periodic with $f(x+2) = f(x)$ has:			
	A)	Only Sine terms	B)	Only Cosine terms
	C)	Both Sine and Cosine terms	D)	Only Sine terms and a non-zero constant