01. Booklungs are found in :
(1) Amoeba
(2) Polystomella
(3) Euglypha
(4) Arachnids

02. Silk is obtained from :
(1) Adult moth
(2) Caterpillar stage
(3) Egg
(4) Cocoon

03. Neurogenic heart is found in :
(1) Human beings
(2) Rat
(3) Rabbit
(4) Invertebrates

04. Epiphysis is also known as :
(1) Pineal
(2) Pituitary
(3) Thyroid
(4) Hypothalamus

05. Simplest and smallest form of amino acid is :
(1) Glycine
(2) Proline
(3) Lysine
(4) Argenine

06. PCOS is related to :
(1) Ovary
(2) Uterus
(3) Testes
(4) Oviduct

07. Seminogelin is secreted by :
(1) Epididymis
(2) Seminal Vesicle
(3) Thecal cells
(4) Oviduct

08. First cleavage in frog is :
(1) Horizontal
(2) Meridional
(3) Equatorial
(4) Latitudinal

09. Which of the following is nuclear receptor ?
(1) AR
(2) GPCR
(3) IR
(4) MT1

10. Cryptorchidism is related to :

(1) Testes (2) Thyroid

(3) Ovary (4) Pancreas

11. Which of the following statements is not true ?

(1) If domain of a function is countable, then its range is also countable.

(2) The set of all real numbers IR is a countable set.

(3) The set of all rational number Q is a countable set.

(4) The family of all finite subsets of a countable set is countable.

12. Let $f : \mathbb{R} \to \mathbb{R}$ be a function such that $f(f(x)) = -x$ for all $X \in \mathbb{R}$ Then :

(1) f is 1 – 1 but not onto.

(2) f is onto but not 1 - 1.

(3) f is both 1 – 1 and onto.

(4) f need not be either 1 -1 or onto.

13. Let G be a finite group and p be a prime number. The number of p – sylow subgroups of G is of the form :

(1) $1 + np$ (2) $n - p$

(3) $np - 1$ (4) $n + p^2$

14. A group G of order 35 :

(1) is abelian but not cyclic (2) is cyclic

(3) is non-abelian (4) does not exist

15. If p is a prime number, then the splitting field over the field of rational numbers, of the polynomial $x^p - 1$ is of degree :

(1) $p + 1$ (2) $2p + 1$

(3) p (4) $p - 1$

16. Which of the following is **correct** ?

(1) There is a field of 35 elements.

(2) There is a field of 48 elements.

(3) There is a field of 64 elements.

(4) There is a field of 80 elements.

17. Let A and B be $n \times n$ matrices such that $BA + B^2 = I - BA^2$, where I is the $n \times n$ identity matrix. Which of the following is always **true** ?

(1) A is non - singular.

(2) B is non - singular.

(3) A + B is non - singular.

(4) AB is non - singular.

18. Let $M_n(K)$ denote the vector space of all $n \times n$ matrices with entries in the field K. Fix a matrix $A = (\alpha_{ij}) \in M_n(K)$ and consider the linear map $T : M_n(K) - M_n(K)$ given by $T(X) = AX$.

Then :

(1) Trace $(T) = n \sum_{i=1}^{n} \alpha_{ii}$

(2) Trace $(T) = \sum_{i=1}^{n} \sum_{j=1}^{n} \alpha_{ij}$

(3) Rank $(T) = n^2$

(4) T is non - singular

19. Let V be a finite dimensional vector space over $\mathbb{R}$. Let $T : V \to V$ be a linear transformation such that rank (T) = rang (T^2). Then which of the following is not correct ?

(1) Kernel (T^2) = Kernel (T)

(2) Range (T^2) = Range (T)

(3) Kernel (T) $\cap$ Kernel $(T^2) = \{0\}$

(4) Range (T) $\cap$ Kernel (T) = $\{0\}$

20. Let X be a metric space and $f : X \to \mathbb{R}$ is a continuous function. Let $G = \{(x, f(x)) : x \in X\}$ be graph of f, then :

(1) G is homeomorphic to $X \times \mathbb{R}$

(2) G is homeomorphic to $\mathbb{R} \times X$.

(3) G is homeomorphic to $\mathbb{R}$.

(4) G is homeomorphic to X.

21. Let X = {a, b, c}. Then which of the following classes of subsets of X is a topology on X ?

(1) $\{\phi, \{a\}, \{b\}, x\}$ (2) $\{\phi, \{a\}, \{b\}, \{c\}, \{a,b\}, x\}$

(3) $\{\phi\ \{a\}, \{a,b\}, x\}$ (4) $\{\phi, \{a,b\}, \{b,c\}, x\}$

22. Every finite Hausdorff is :

(1) a discrete space (2) an indiscrete space

(3) not a T_1 – space (4) not a T_4 – space

23. Let M denote the family of all Lebesgue measurable subsets of $\mathbb{R}$. Which of the following is not true ?

(1) $A_1 A_2 \in M \Rightarrow A_1 \cup A_2 \in M$

(2) $A_1 A_2 \in M \Rightarrow A_1 \cap A_2 \in M$

(3) If the Lebesgue out measure of a subset A of IR is zero, then $A \in M$.

(4) If $A_n \in M$ for each $n \in \mathbb{N}$, then $M\left(\bigcup_{n=1}^{\infty} A_n\right) = \sum_{n=1}^{\infty} m(A_n)$, where m denotes the Lebesgue measure.

24. Let X be a normed linear space consider the following statements.

I : If X is a Banach space then $\{x \in X : ||x|| = 1\}$ is complete.

II : If $\{x \in X : ||x|| = 1\}$ is complete, then X is a Banach space.

Then :

(1) Both I and II are true. (2) Neither I nor II is true.

(3) I is true but II is false. (4) II is true but I is false.

25. Let $l^2 = \{a = (ak)_{k\geq 1} : a_k \in \mathbb{C}$ and $\left\{\sum_{k=1}^{\infty} |ak|^2\right\}^{1/2} = \|a\|_2 < \infty\}$ and

$l^\infty \{a = (ak)_{k\geq 1} : ak \in \mathbb{C} \ \sup_{k\geq 1} |ak| < \infty\}$

Define a map $T : l^\infty \to l^2$ as

$$T(a) = \{a_1, \frac{a_2}{2}, \frac{a_3}{2^2}, \frac{a_4}{2^3}, \ldots\ldots\ldots\}$$

Which of the following statements in **true** ?

(1) T is discontinuous linear map.

(2) T maps l^∞ anto l^2.

(3) T^{-1} exists and is continuons.

(4) T is uniformal continuous.

26. Let $f : IR \to IR$ be twice differentiable function, with $f(0) = f(1) = f'(0) = 0$. Then :

(1) f'' is a zero function (2) $f''(0) = 0$

(3) $f''(x) = 0$ for some $x \in (0, 1)$ (4) f'' never vanishes

27. Let A be subset of IR, $A \neq \phi$, $A \neq IR$ and A is closed, then A is :

(1) the closure of interior of A (2) a countable set

(3) a compact set (4) not opoen

28. Let $P > 1$ then $\lim_{n\to\infty} \left(\frac{1}{1^p} + \frac{1}{2^p} + \ldots\ldots + \frac{1}{n^p}\right)$ is :

(1) $\frac{1}{1-p}$ (2) $\frac{1}{1+p}$

(3) $\frac{1}{p-1}$ (4) $\frac{1}{p}$

29. The radius of convergence of the power series $\sum_{n=1}^{\infty} \frac{1}{n^{10}} x^n$ is :

(1) 1
(2) 2
(3) 0
(4) ∞

30. The residue of the function $\frac{e^{2z}}{(z+1)^3}$ at.

$z = -1$ is :

(1) e^2
(2) $2e^2$
(3) $2e^{-2}$
(4) 0

31. The real projective space IRP^n is :

(1) orientable if n is even.
(2) always orientable.
(3) not orientable if n is even.
(4) always non – orientable.

32. Which one of the following statements is not correct ?

(1) Every smooth manifold satisfies the first axiom of countablity.
(2) Every smooth manifold is locally connected.
(3) If a smooth manifold is Hausdorff, then it is locally compact.
(4) Every smooth manifold is para compact.

33. Which of the following statements is not true ?

(1) The Lie bracket operation is $\mathbb{R}$ – linear.
(2) The Lie bracket operation is not skew – symmetric.
(3) The Lie bracket operation satisfies the Jacobi identity.
(4) The Lie bracket operation satisfies
$[f X, g Y] = f g [X, Y] + f (X g) Y - g (Y f) X$

34. Suppose $f : D - \mathbb{C}$ is of class C^1 on some open subset D of $\mathbb{C}^n$. Then f is holomorphic on D if and only if :

(1) $\frac{\partial f}{\partial \overline{z}^k} = 0, \quad K = 1, 2, \ldots\ldots n,$

(2) $\frac{\partial f}{\partial z^k} = 0, \quad K = 1, 2, \ldots\ldots n,$

(3) $\frac{\partial f}{\partial z^k} + \frac{\partial f}{\partial \overline{z}^k} = 0, \; k = 1, 2, \ldots\ldots, N.$

(4) $\frac{\partial f}{\partial z^k} = \frac{\partial f}{\partial \overline{z}^k}, \quad K = 1, 2, \ldots\ldots, n.$

35. For the Problem : Maximise $\left(x_1^{1/3} . x_2^{2/3}\right)$ subject to $x_1 + 2x_2 = 100$, the optimal value is :

(1) $\frac{100}{3}$ (2) $\frac{3}{100}$

(3) $\frac{50}{3}$ (4) $\frac{200}{3}$

36. The function $f(x) = \begin{cases} x, & 0 \le x \le 1 \\ 1; & 1 \le x \le 2 \end{cases}$ is :

(1) Convex

(2) Quasi – convex

(3) Semi – strictly quasi convex

(4) All above are true

37. The partial differential equation
$f(x, y, u)\, u_x + g(x, y, u)\, u_y = h(x, y, u)$ is a :

(1) Linear equation
(2) Semi - linear equation
(3) Quasi linear equation
(4) None of the above

38. A solution of PDE

$$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + \left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial y}\right)^2 - 4 = 0$$ represents :

(1) an ellipse in xy - plane.
(2) an ellipsoid in xyu space.
(3) a parabola in u - x plane.
(4) a hyperbola in u - y plane.

39. For an irrotatcional motion of a fluid, which of the following statements is always true ?

(1) The vorticity vector is zero.
(2) The vorticity vector is non - zero.
(3) Divergence of velocity is non - zero.
(4) Divergence of velocity is zero.

40. The complex potential of a uniform flow U making an angle α with x - axis is :

(1) $Ue^{i(\pi+\alpha)}z$
(2) $Ue^{i(\pi-\alpha)}z$
(3) $-Ue^{i(\pi+\alpha)}z$
(4) $-Ue^{i(\pi-\alpha)}z$