DCET 2023 - Question Paper & Solutions

1. In a square matrix, if the elements above the pricipal diagonal are zero, then it is called

a) Identity matrix

b) Lower triangular matrix

c) Upper triangular matrix

d) Diagonal matrix

Ans : (b)

$$A = \begin{bmatrix} 2 & 0 & 0 \\ 1 & 4 & 0 \\ 2 & 5 & 1 \end{bmatrix}$$

2. The value of x if $\begin{bmatrix} x-1 & 2 \\ 2 & 4 \end{bmatrix}$ is singular, is

a) 3 b) 8 c) -2 d) 2

Ans : (d)

Given matrix $A = \begin{bmatrix} x-1 & 2 \\ 2 & 4 \end{bmatrix}$ is singular

w.k.t. $|A| = 0$ $\because$ singular

$$\begin{vmatrix} x-1 & 2 \\ 2 & 4 \end{vmatrix} = 0$$

$$(x-1)4 - 4 = 0$$

$$4x - 4 - 4 = 0$$

$$4x = 8$$

$$x = \frac{8}{4} \quad \mathbf{x = 2}$$

3. The inverse of the matrix $A = \begin{bmatrix} -1 & 0 \\ 5 & 7 \end{bmatrix}$ is

a) $-\frac{1}{7}\begin{bmatrix} 7 & 0 \\ -5 & -1 \end{bmatrix}$ b) $\frac{1}{7}\begin{bmatrix} 7 & 0 \\ -5 & -1 \end{bmatrix}$

c) $-\frac{1}{7}\begin{bmatrix} -7 & 0 \\ -5 & -1 \end{bmatrix}$ d) $\frac{1}{7}\begin{bmatrix} 7 & 0 \\ 5 & 1 \end{bmatrix}$

Ans : (a)

Given matrix $A = \begin{bmatrix} -1 & 0 \\ 5 & 7 \end{bmatrix}$

WKT $A^{-1} = \frac{1}{|A|}\text{adj } A$

$\therefore$ adjoint of $A = \begin{bmatrix} 7 & 0 \\ -5 & -1 \end{bmatrix}$

and $|A| = \begin{bmatrix} -1 & 0 \\ 5 & 7 \end{bmatrix} = -7 - 0 = -7$

$\therefore A^{-1} = \frac{-1}{7}\begin{bmatrix} 7 & 0 \\ -5 & -1 \end{bmatrix}$

4. The eigenvalue of the matrix $A = \begin{bmatrix} 3 & 0 \\ 1 & 3 \end{bmatrix}$ is

a) 2, 2 b) $-3, -3$

c) 3, 3 d) $-3, 3$

Ans : (c)

Given $A = \begin{bmatrix} 3 & 0 \\ 1 & 3 \end{bmatrix}$

The characteristic equation of A is, $|A - \lambda I| = 0$

$$\begin{vmatrix} 3-\lambda & 0 \\ 1 & 3-\lambda \end{vmatrix} = 0$$

$$(3-\lambda)(3-\lambda) - 0 = 0$$

$$(3-\lambda) = 0 \;\&\; (3-\lambda) = 0$$

$$\boldsymbol{\lambda = 3,\ \lambda = 3}$$

5. The two lines $ax + by = c$ and $a'x + b'y = c'$ are perpendicular if

a) $ab' = ba'$ b) $aa' + bb' = 0$

c) $a'b + a'b' = 0$ d) $ab' + ba' = 0$

Ans : (b)

Given $ax + by = c$ and $a'x + b'y = c'$ are perpendicular

$ax + by = c$ ---- (i)

$$\therefore m_1 = \frac{-a}{b}$$

$a'x + b'y = c'$ ---- (ii)

$$\therefore m_2 = \frac{-a'}{b'}$$

$\therefore m_1 m_2 = -1$ ($\because$ lines are perpendicular)

$$\left(-\frac{a}{b}\right)\left(-\frac{a'}{b'}\right) = -1$$

$$aa' = -bb'$$

$$aa' + bb' = 0$$

6. The *y*-intercept of any line passing through the origin in

a) 0 b) 1 c) – 1 d) 2

Ans : (a)

The y-intercept of any line passing through the origin is zero.

7. Slope intercept form of straight line is

a) $y + mx - c = 0$ b) $x = my + c$

c) $y = x + m$ d) $y = mx + c$

Ans : (d)

The slope intercept from the strait line is $y = mx + c$.

8. The tangent of the angle of intersection between two lines with slopes m_1 and m_2 is

a) $\left|\frac{m_1 + m_2}{1 - m_1 m_2}\right|$ b) $\left|\frac{m_1 + m_2}{m_1 - m_2}\right|$

c) $\left|\frac{m_1 - m_2}{1 - m_1 m_2}\right|$ d) $\left|\frac{m_1 - m_2}{1 + m_1 m_2}\right|$

Ans : (d)

The tangent of the angle of interaction between two lines with slopes m_1 and m_2 is $\left|\frac{m_1 - m_2}{1 + m_1 m_2}\right|$

9. If the ladder is inclined to the wall at an angle of 135°, then the inclination in radians is

a) $\frac{4\pi}{3}$ b) $\frac{3\pi}{4}$ c) $\frac{2\pi}{4}$ d) $\frac{4\pi}{5}$

Ans : (b)

Given angle $\theta = 135°$

$$\text{Angle in radian} = \frac{\pi}{180} \times \theta = \frac{\pi}{180} \times 135$$

$$= \frac{3\pi}{4} \text{ radian}$$

10. The value of sin 60° cos 30° – cos 60° sin 30° is

a) $\frac{1}{2}$ b) $-\frac{1}{2}$ c) $\frac{\sqrt{3}}{2}$ d) 0

Ans : (a)

$= \sin 60° \cos 30° - \cos 60° \sin 30°$

$$= \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} - \frac{1}{2} \cdot \frac{1}{2} \times \frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$$

11. The simplified value of $\frac{\sin 3A + \sin A}{\sin 3A - \sin A}$ is

a) $\cot A \tan 5A$ b) $\tan A \cot 2A$

c) $\tan 2A \cot A$ d) $\tan 3A \cot 2A$

Ans : (c)

$$\frac{\sin 3A + \sin A}{\sin 3A - \sin A} = \frac{2\sin\left(\frac{3A + A}{2}\right)\cos\left(\frac{3A - A}{2}\right)}{2\cos\left(\frac{3A + A}{2}\right)\sin\left(\frac{3A - A}{2}\right)}$$

$$\left[\because \sin C + \sin D = 2\sin\left(\frac{C + D}{2}\right)\cos\left(\frac{C + D}{2}\right)\right.$$

$$\left[\because \sin C - \sin D = 2\cos\left(\frac{C + D}{2}\right)\sin\left(\frac{C - D}{2}\right)\right.$$

$$= \frac{2\sin 2A \cos A}{2\cos 2A \sin A} = \tan 2A \cot A$$

12. If $y = \log x + \sec 2x$, then $\frac{dy}{dx}$ is

a) $-\frac{1}{x} + \sec 2x \tan x$

b) $\frac{1}{x} + 2 \sec 2x \tan 2x$

c) $\frac{1}{\sqrt{x}} + \sec x \tan x$

d) $-\frac{1}{\sqrt{x}} + \sec 3x \tan 2x$

Ans : (b)

If $y = \log x + \sec 2x$, then

$$\frac{dy}{dx} = \frac{1}{x} + 2 \sec 2x \tan 2x$$

13. The derivative of the function $\frac{1+x}{1-x}$ is

a) $\frac{-2}{(1-x)^2}$ b) $\frac{2x}{(1-x)^2}$

c) $\frac{-2x}{(1-x)^2}$ d) $\frac{2}{(1-x)^2}$

Ans : (d)

Given $y = \frac{1+x}{1-x} = \frac{x-1}{-x+1}$

$$\frac{dy}{dx} = \frac{[1-(-1)]\cdot 1}{(1-x)^2} = \frac{2}{(1-x)^2}$$

[shortcut method: $y = \frac{ax+d}{cx+d}$ then $\frac{dy}{dx} = \frac{(ad-bc)f'(x)}{(cx+d)^2}$

14. Find the second order derivative of $y = e^{2x} - e^{-x}$

a) $4e^{2x} - e^{-x}$ b) $4e^{2x} + e^{-x}$

c) $-4e^{2x} - e^{-x}$ d) $4e^{2x} + e^{x}$

Ans : (a)

Given $y = e^{2x} - e^{-x}$

$$\frac{dy}{dx} = 2e^{2x} + e^{-x}$$

$$\frac{d^2y}{dx^2} = 4e^{2x} - e^{-x}$$

15. The equation of the tangent to the curve $y = 2x^2 + x$ at (1, 2) is

a) $5x - y - 3 = 0$ b) $5x + y + 3 = 0$

c) $5x + y - 6 = 0$ d) $5x + y + 6 = 0$

Ans : (a)

Given $y = 2x^2 + x$

$$\frac{dy}{dx} = 4x + 1$$

$$m = \left.\frac{dy}{dx}\right|_{(1,2)} = (4 \times 1) + 1 = 5$$

The equation of tangent is given by

$$y - y_1 = m(x - x_1)$$
$$y - 2 = 5(x - 1)$$
$$y - 2 = 5x - 5$$
$$5x - y - 5 + 2 = 0$$
$$\therefore 5x - y - 3 = 0$$

16. The value of $\int (\sec x \tan x + \sec^2 x)\,dx$ is

a) $\sec 2x + \tan x + c$ b) $\sec x + \operatorname{cosec} x + c$

c) $\sec x + \tan x + c$ d) $\sec 2x - \operatorname{cosec}^2 x + c$

Ans : (c)

$$\int (\sec x \tan x + \sec^2 x)\,dx = \sec x + \tan x + c$$

17. The value of

$$\int (2x^3 + 3x^2 + 2x)^{10} (3x^2 + 3x + 1)\,dx \text{ is}$$

a) $\frac{1}{22}(6x + 3x^2 + 2x)^{11} + c$

b) $\frac{1}{22}\left(2x^3+3x^2+2x\right)^{11}+c$

c) $\frac{1}{22}\left(2x^3+3x^2-2x\right)^{12}+c$

d) $\frac{1}{12}\left(2x^3+3x^2-2x\right)^{12}+c$

Ans : (b)

$\int\left(2x^3+3x^2+2x\right)^{10}\left(3x^2+3x+1\right)dx$

$\int[f(x)]^n f'(x)dx=\frac{[f(x)]^{n+1}}{n+1}+c$

$\therefore \frac{1}{2}\int\left(2x^3+3x^2+2x\right)^{10}\left(6x^2+6x+2\right)dx$

$=\frac{1}{2}\frac{\left(2x^3+3x^2+2x\right)^{11}}{11}+C$

$=\frac{1}{22}\left(2x^3+3x^2+2x\right)^{11}+C$

18. The value of $\int_0^{\pi/4}\tan^2 x\,dx$ is

a) $1+\frac{\pi}{4}$ b) $1+\frac{4\pi}{2}$

c) $1-\frac{\pi}{4}$ d) $1-\frac{4\pi}{2}$

Ans : (c)

$\int_0^{\pi/4}\tan^2 x\,dx=\int_0^{\pi/4}\left(\sec^2 x-1\right)dx$

$=\tan^2 x \quad (\because \sec^2\theta-\tan^2\theta=1)$

$=[\tan x-x]_0^{\pi/4}=\tan\pi/4-\pi/4-0$

$=1-\pi/4$

19. The area bounded by $y=\sin x$ and x-axis from $x=0$ to $x=\pi$ is

a) 2 b) – 2 c) 3 d) 1

Ans : (a)

The required area is given by

$$A=\int_0^{\pi}y\,dx=\int_0^{\pi}\sin x\,dx$$

$$=[-\cos x]_0^{\pi}=-\cos\pi-(\cos 0)$$

$$=-(-1)+1=2$$

20. The value of tan 45° cot 225° + tan² 60° is

a) – 4 b) 4 c) 2 d) 3

Ans : (b)

$\tan 45^\circ\cot 225^\circ+\tan^2 60^\circ=1\times\cot(180^\circ+45^\circ)+\left(\sqrt{3}\right)^2$

$=1\times\cot 45^\circ+3$

$=(1\times 1)+3=1+3=4$

21. _____ is an example of quantitative data.

a) Volume b) Words

c) Symbols d) Colour

Ans : (a)

The data which can be numerically measurable is called quantitative data.

"Volume" measured in numbers.

$\therefore$ Volume is a quantitative data

22. Data cleaning in the process of

a) removing viruses

b) correctly formatting data

c) removing duplicate data

d) properly formatting data

Ans : (Grace)

Data cleaning is the process of fixing (or) removing incorrect, corrupted, incorrectly formatted, duplicate (or) incomplete data with in a dataset.

23. _____ is *not* a data collection tool.

a) Word b) Focus Group Discussion

c) Survey d) Questionnaires

Ans : (a)

The data collection tools focus group discussion, survey method, questionnaires, observation, Interview method.

$\therefore$ Word is not a data collection tool

24. The graph of cumulative frequency is called

a) Frequency polygon

b) Histogram

c) Cumulative frequency polygon

d) Frequency histogram

Ans : (Grace)

The cumulative frequencies can be plotted only on cumulative frequency polygon (or) cumulative frequency curve (O give curve)

25. To calculate percentage frequency, we use _____ formula.

a) P.f. = $(f \times n) + 100$

b) P.f. = $(f \div n) \times 100$

c) P.f. = $(100) + (f \times n)$

d) P.f. = $(100) \times (f \div n)$

Ans : (b & d)

Percentage frequency = $\left[\frac{f}{n}\right] \times 100$

26. If X_1, X_2, X_3 ...., X_n are the observations of a given data, then the mean of the observation will be :

a) $\frac{Total\ number\ of\ observations}{Sum\ of\ observations}$

b) Sum of observations + Total number of observations

c) $\frac{Sum\ of\ observations}{Total\ number\ of\ observations}$

d) Total number of observations – Sum of observations

Ans : (c)

Mean of the observations is

$$\overline{X} = \frac{X_1 + X_2 + X_3 + ... + X_n}{n} \quad \text{or}$$

$$\overline{X} = \frac{\sum X}{n} \quad \text{or}$$

$$\overline{X} = \frac{Sum\ of\ observations}{Total\ number\ of\ observations}$$

27. The end points of a class interval are the ____ and _____ values that a variable can take.

a) Lowest and Highest

b) Minimum and Maximum

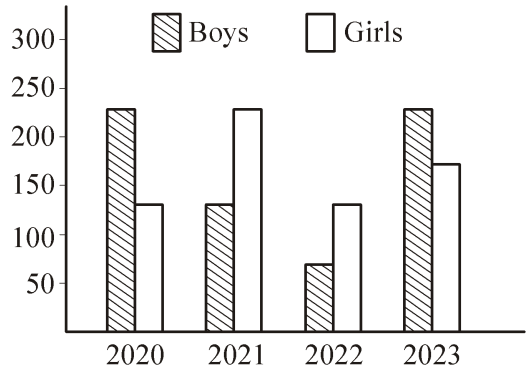
c) Numeral and Average

d) Mean and Mode

Ans : (a)

If [10 – 20] is a class interval and the end points of the class interval are 10 and 20, which are the lowest and highest values in the variable.

The graph given below, shows the participating of students of a school in outdoor games in different years. By using the data given below, answer the following questions (28 - 29) :



28. In which years did the girls participate more than the boys?

a) 2020, 2023 b) 2021, 2022

c) 2022, 2023 d) 2020, 2021

Ans : (b)

Boys participation in	Girls participation in
2020 = 225	2020 = 125
2021 = 125	2021 = 225
2022 = 50	2022 = 125
2023 = 225	2023 = 150

From the above table, in 2021 and 2022 girls participate more than boys.

29. In which two years did an equal number of boys participate?

a) 2020, 2021 b) 2020, 2022
c) 2020, 2023 d) 2021. 2022

Ans : (c)

From the above table, In the year 2020 and 2023 there are equal number of boys participate.
In 2020 Boys participate = 225
In 2023 Boys participate = 225

30. To find third quartile in Excel, we use ____ formula.

a) = QUARTER (3, Range)
b) = QUARTILE (3, Range)
c) = QUARTER (Range, 3)
d) = QUARTILE (Range, 3)

Ans : (d)

The formula for finding 3rd quartile in excel is
= QUARTILE (Range, 3)

31. The percentile divides a series into _____ equal parts.

a) fifty b) twenty
c) ten d) hundred

Ans : (d)

Data which divides into 100 equal parts is called percentile. It is denoted by P

32. The value of first quartile is 23 and interquartile of set of data range is 20. The value of third quartile is

a) 23 b) 33 c) 43 d) 53

Ans : (c)

Given, 1st quartile = $Q_1 = 23$
Inter quartile range = $Q_3 - Q_1 = 20$ ---- (1)
From equation (1)
$Q_3 - Q_1 = 20$
$Q_3 - 23 = 20$
$Q_3 = 20 + 23$
$Q_3 = 43$ $\therefore$ Third quartile = 43

33. The algebraic sum of the deviations of a frequency distribution from its mean is always

a) a non-zero number b) zero
c) less than zero d) greater than zero

Ans : (b)

The property of arithmetic mean is
The algebraic sum of the deviations of a frequency distribution from its mean is equal to zero.

i.e., $\sum\left(X - \overline{X}\right) = 0$

34. The Excel formula for 'Mean' is

a) = MEDIAN (array of numbers)
b) = AVERAGE (array of numbers)
c) = MEAN (array of numbers)
d) = MODE (array of numbers)

Ans : (b)

The Excel formula for "mean" is
= AVERAGE (array of numbers)

35. What is output syntax in Python?

a) Print (" ") b) PRINT (" ")
c) print (" ") d) Printf (" ")

Ans : (c)

in python print (" ") statement is used for output

36. "str" is a

a) Text Type b) Numeric Type
c) Binary Type d) Sequence Type

Ans : (a)

str is text Type

37. In Python, _____ standard data types are commonly used.

a) three b) five

c) ten d) four

Ans : (Grace)

in python standard data types are numeric, Dictionary, Boolean, Set, Sequence types

38. The result of Python program gets displayed in _____

a) IDLE Shell 3.9.1 window

b) IDLE Shell 3.1.9 window

c) ILDE Shell 3.9.1 window

d) IELD Shell 3.9.1 window

Ans : (a)

IDLE3.9.1 is the first version of Python it is Integrated Development and Learning Environment.

39. Which one of the following quotations in Python does not accept the quotes to denot strings?

a) (' ') b) (" ")

c) ( ) d) (''' ''')

Ans : (c)

in python its accept single quote double quote and triple quote.

40. In Python, _____ is used to end the physical line or ignore the comment.

a) ** b) # c) & d) \\

Ans : (b)

In Python, the # character is used to start a comment. The comment continues after the # until the end of the line.

41. Which of the following is *not* a cyber crime?

a) Cryptography

b) Denial of Service

c) Man-in-the-middle attack

d) Phishing

Ans : (a)

Cryptography is the process of hiding or coding information so that only the person a message was intended for can read it.

42. DoS is abbreviated as _____

a) Denial of Service b) Distribution of Server

c) Distribution of Service

d) Denial of Server

Ans : (a)

DOS Expansion is denial-of-service.

43. _____ protects interconnected systems including hardware, software and programs and data from cyber attacks.

a) Cyber Security b) Computer Security

c) Resource Security d) Hardware Security

Ans : (a)

CYBER SECURITY is a protection of interconnected systems including hardware software and program and data from cyber-attack.

44. Basic functionality of the network device firewall is :

a) scans mobile applications

b) monitoring database

c) privatizes the computers

d) monitoring incoming and outgoing networks

Ans : (d)

A firewall is a network security device that monitors incoming and outgoing network traffic and decides whether to allow or block specific traffic based on a defined set of security rules

45. An algorithm represented in the form of programming language is called :

a) Flowchart b) Pseudocode

c) Program d) Instruction

Ans : (c)

An algorithm represented in the form of a programming language is called a program.

46. The _____ symbol is used when the flowchart is starting or ending.

a) Connector/Arrow
b) Terminal box/Rounded rectangle
c) Input/Output d) Process

Ans : (b)

in flow chart "Terminator Symbol," this symbol represents the start points, end points, and potential outcomes of a path 

47. MIT App Inventor allows user to

a) Create web application
b) Build Android application
c) Create System Software
d) Develop Operating System

Ans : (b)

MIT app inventor allows user tobuild fully functional apps for smartphones and tablets.

48. What is the function of the "when green flag clicked" command block?

a) Points Sprite in the specified direction
b) If condition is true, runs the blocks inside
c) Runs the script
d) Stops the execution of script

Ans : (c)

Runs the script: - when green flag clicked block triggers the execution of the script or program attached to it.

49. The correct sequence of HTML tags for starting a webpage is

a) Head, Title, Html, Body
b) Html, Head, Title, Body
c) Html, Body, Title, Head
d) Html, Title, Head, Body

Ans : (b)

The correct sequence of HTML tags to start a webpage is html, head, title, and body.

50. Web server :

a) is a computer system that delivers web pages
b) is delivery news
c) provides options for those seeking real-time discussions
d) prints documents

Ans : (a)

A web server stores and delivers the content for a website

51. Which of the following is used to style the appearance of web pages?

a) Html b) JavaScript c) PHP d) CSS

Ans : (d)

CSS is used to define styles for your web pages, including the design, layout and variations in display for different devices and screen sizes

52. Which of the following is an example of web browser?

a) Google b) Firefox
c) Apache d) MySQL

Ans : (b)

Fire fox is example of web browser

53. Which of the following is an open source and free workflow management software?

a) Trello b) MS Excel
c) Windows d) Linux

Ans : (a)

Trello is the visual tool that empowers your team to manage any type of project, workflow or task tracking.

54. ERP package will handle _____ business functionality/functionalities.

a) One b) Two c) Three d) Multiple/all

Ans : (d)

ERP systems supports all aspects of modules and provide transparency into complete business process.

55. _____ is a visual diagram of a company that describes what employees do, whom they report to and how decisions are made across the business.

a) Physical Structure b) Organizational Structure
c) Logical Structure d) Hybrid Structure

Ans : (b)

Organisational structure describes entire structure of organisation and work structure of employees.

56. _____ is a methodology used in system analysis to identify, clarify, and organize system requirements.

a) Workflow b) Use case
c) Algorithm d) Software

Ans : (a)

Workflow helps in identifying, clarify requirements of organise system.

57. Which of the following is *not* an application of IoT?

a) Web browser b) Smart home
c) Smart city d) Self-driven cars

Ans : (a)

Smart home smart city self-driving cars applications of IoT but web browser is not a application of IoT.

58. Which of the following is *not* a cloud service option ?

a) VaaS b) IaaS c) PaaS d) SaaS

Ans : (a)

PAAS, SAAS,IAAS all three is cloud services but VAAS(Voice as a service) is not cloud service

59. How many types of services are offered by cloud computing to the users ?

a) 2 b) 4 c) 3 d) 5

Ans : (c)

PAAS, SAAS,IAAS services offered by cloud services.

60. Combination of Public and Private deployment is called

a) Hybrid b) Hyper
c) Public d) Private

Ans : (a)

Hybrid cloud refers to a mixed computing, storage, and services environment made up of on-premises infrastructure, private cloud services, and a public cloud—such as Amazon Web Services (AWS) or Microsoft Azure—with orchestration among the various platforms

61. Unit of electrical power is

a) Volt b) Watt
c) Watt-hour d) Ampere-hour

Ans : (b)

A Watt is the unit of electrical power equal to one ampere under the pressure of one volt. 1 W is the power consumed by a device that carries 1 A of current when operated at a potential difference of 1 V.

62. In pipe earthing, the diameter of GI pipe embedded in the pit is

a) 32 mm b) 38 mm
c) 48 mm d) 56 mm

Ans : (b)

The size of the pipe used for earthing is of diameter 40 mm and 2.5 meters in length for ordinary soil or greater length in case of dry and rocky soil.

Pipe electrodes shall not be smaller than 38 mm internal diameter if made of galvanized iron or steel, and 100 mm internal diameter if made of cast iron.

63. If a resistor of 100 ohms is connected in series with a parallel combination of two 200 ohms resistors, then the effective resistance is

a) 200 ohms
b) 250 ohms
c) 350 ohms
d) 150 ohms

Ans : (a)

The series combination of resistor is $R_1 = 100\Omega$

For parallel combination of resistor, lets $R_2 = 200\Omega$ and $R_3 = 200\Omega$

To calculate total parallel resistor $R_p = \frac{R_2 R_3}{R_2 + R_3}$

$= \frac{200 \times 200}{200 + 200} = 100\Omega$

The effective resistance is $R_p + R_1 = 100+100 = 200\Omega$

64. If a resistor of 20 Ω is connected across a source of 5 volts DC supply, then the current in the circuit is

a) 1 Ampere b) 4 Amperes

c) 0.5 Amperes d) 0.25 Amperes

Ans : (d)

Lets consider, $R_1 = 20\Omega$ $V = 5V$

Current in the circuit is given by $I = \frac{V}{R} = \frac{5}{20}$

= 0.25 Amperes

65. Power factor is

a) ratio of resistance to inductance

b) ratio of apparent power to true power

c) ratio of resistance to impedance

d) ratio of inductance to capacitance

Ans : (C)

In AC circuits, the power factor is defined as the ratio of the resistance (R) to impedance (Z) in the circuit. Where φ is the angle between voltage and current. If the current lags the voltage, the power factor will be lagging. If the current leads the voltage, the power factor will be leading.

66. The phase-to-neutral voltage in a 3-phase star connected system is 230 V. The phase-to-phase (line-to-line) voltage is

a) 230 V b) 398.37 V

c) 400 V d) 440 V

Ans : (b)

The phase-to-phase (line-to-line) voltage is given by, where Vph = 230V

$VL = \sqrt{3} \times Vph. = \sqrt{3} * 230 = 398.37$ V

67. The time period of an AC wave at frequency of 50 Hz is

a) 2 milliseconds b) 10 milliseconds

c) 20 milliseconds d) 50 milliseconds

Ans : (c)

Time period of a wave is given by $= \frac{1}{frequency}$

$= \frac{1}{50} = 0.02$ s

Since the options is in milliseconds = 0.02*1000 = 20milliseconds.

68. The type of fuse used for domestic purpose is

a) HRC fuse

b) Kit kat or rewirable fuse

c) Ceramic cartridge fuse

d) Glass cartridge fuse

Ans : (b)

Purpose of fuse in household circuit: It safeguards the circuit and the appliances connected in the circuit from being damaged. It also protects the appliences from the current that over exceeds the specified value due to voltage fluctuation, short circuit.

69. MCCB stands for

a) Molded Case Circuit Breaker

b) Miniature Case Circuit Breaker

c) Maximum Current Circuit Breaker

d) Minimum Current Circuit Breaker

Ans : (a)

MCCB stands for Molded Case Circuit Breaker

70. ELCB is used for detecting current leakage

a) above 8 kVA b) below 5 kVA

c) above 5 kVA d) below 8 kVA

Ans : (Grace)

71. A static machine which transfers electrical power from one circuit to another circuit without changing the frequency is called

a) DC machine b) Alternator
c) Induction motor d) Transformer

Ans : (d)

Since it is designed to either increase or decrease AC voltage between the circuits while maintaining the same frequency of the current.

72. The initial type of connection of the motor windings when started with a star delta starter is

a) star connection b) delta connection
c) series d) parallel

Ans : (a)

During starting the stator winding is star connected, which provides less starting torque and puts less mechanical and electrical stress on the system, thereby increasing its lifespan.

73. The cause for a 3-phase motor producing inadvertent mechanical noise is :

a) Interchanged supply terminals
b) High load on motor
c) High voltage on motor winding
d) Incorrect coupling

Ans : (d)

If the coupling is not aligned perfectly, it can cause excessive wear on the parts and eventually lead to failure. Other causes of coupling failure include poor installation, incorrect size, and material issues. Pump coupling failure can have a significant impact on the operation of a facility.

74. Cell is an _____ device

a) electro-mechanical
b) electro-chemical
c) electro-magnetic
d) electro-dynamic

Ans : (b)

An electrochemical cell is a device that can generate electrical energy from the chemical reactions occurring in it, or use the electrical energy supplied to it to facilitate chemical reactions in it. These devices are capable of converting chemical energy into electrical energy, or vice versa.

75. The most commonly used battery in electric vehicles is

a) Lithium-ion battery b) Lead-acid battery
c) Nickel-Cadmium battery
d) Alkaline rechargeable battery

Ans : (a)

Lithium-ion batteries power the lives of millions of people every day. From laptops and cell phones to hybrids and electric cars, this technology is growing in popularity due to its light weight, high energy density, low self-discharge, no memory effect, may offer longer life and ability to recharge.

76. Digital signals are characterized by

a) Continuous voltage levels
b) Infinite resolution
c) Discrete voltage levels
d) Variable voltage levels

Ans : (c)

A digital signal can only take on one value from a finite set of possible values at a given time. With digital signals, the physical quantity representing the information can be many things: Variable electric current or voltage.

77. According to rules and laws of Boolean Algebra, A + A = _____

a) 2A b) A c) 1 d) A^2

Ans : (b)

When both the inputs are the same, applying either an AND gate or OR gate will result in an output equal to the input.

$\therefore A + A = A \quad \& \quad A \cdot A = A$

78. Photo diode is used in which of the following applications ?

a) Voltage regulation
b) Temperature measurement
c) Light detection
d) Radio Frequency (RF) Amplification

Ans : (c)

This effect of the proportional change in photocurrent with the change in light intensity can be easily observed by applying a reverse bias. Since photodiodes generate current flow directly depending upon the light intensity received, they can be used as photodetectors to detect optical signals.

79. If a resistor is having a colour band as first band = Brown, second band = Black and third band = Red, then the resistance value is

a) 1 kΩ b) 10 kΩ
c) 100 Ω d) 100 kΩ

Ans : (a)

According to colour code method each bands will have its own values, i.e., 1st band Brown = 1, 2nd band Black = 0, 3rd band is Red (multiplier band) = 100

Multiply all the band values. Then the resistance values is, 10*100 = 1000 = 1kΩ

80. The binary equivalent of the decimal number 9 is

a) 1001 b) 1000 c) 1100 d) 1010

Ans : (a)

2	9	 1
2	4	 0
2	2	 0
	1	

$\therefore 9_{10} = 1001_2$

81. Project Management is a combination of

a) human and non-human resources
b) only human resources
c) only non-human resources
d) no resources at all

Ans : (a)

Project management involves the coordination and utilization of both human resources (such as project managers, team members, stakeholders) and non-human resources (such as tools, equipment, technology, materials, and finances) to achieve project goals and objectives. It is a holistic approach that combines both human and non-human elements to successfully complete a project.

82. The consultant who is appointed to carry out the project work is

a) Compound house consultant
b) In-house consultant
c) Out-house consultant
d) Bridge consultant

Ans : (c)

An outsourced consultant is someone who is hired from outside the organization to provide expertise, guidance, and support for a specific project or task

83. The type of project which requires minimum amount of capital is

a) Crash project b) Normal project
c) Disaster project d) Consultant project

Ans : (b)

Normal projects, will be allowed to take their normal time, minimum capital with no sacrifice in quality.

84. Projects like building a hospital, a park, a playground and government projects like highway construction are examples of

a) Social needs b) Customer needs
c) Market needs d) Ecological needs

Ans : (a)

The basic requirements for a society is hospital, park, schools, road construction etc., hence they all are social need projects.

85. In Project Management, WBS stands for

a) Work Breakdown Structure
b) Waste Breakdown Structure
c) Window Breakdown Structure
d) Wireless Breakdown Structure

Ans : (a)
WBS full form: Work Breakdown Structure

86. The first step in Project Execution Plan is

a) Work packaging plan
b) Contracting plan
c) Organization plan
d) Procedure plan

Ans : (b)
Under the four sub plans of Project Execution Plan, the contracting plan will be the first step used in preparation of PEP. To develop self-regulating systems, it is necessary to contract out those areas where the owner companies do not have inherent competence.

87. The team which gives the idea to start a project is

a) Core project team
b) Full project team
c) Advising project team
d) Initial project team

Ans : (d)
The initial project team consists of specific people who initially conceive the idea of starting a project.

88. In PEP, the letter 'E' stands for

a) Execution b) Estimation
c) Evaluation d) Enthusiasm

Ans : (a)
PEP full form Project Execution Plan.

89. In Project Life Cycle, more time is required for

a) Project closure b) Project initiation
c) Project execution d) Project planning

Ans : (c)
Execution phase consumes maximum time to complete work in a project life cycle.

90. Innovation is the hallmark of every project. Here innovation means

a) New ideas
b) Project success
c) Professional approach
d) Project Management

Ans : (a)
Innovation is a hallmark of many successful projects, and it refers to the process of introducing new ideas, methods, products, services, or approaches that create value and improve upon existing practices.

91. The Project Life Cycle Curve indicates

a) Work packaging
b) Number of workers in the project
c) Growth, maturity and decline
d) Project manual

Ans : (c)
Project life cycle curve explains how project is initiated, its growth, its working process, maturity and the completion of project.

92. In Project Management, taking actions to measure the quality accurately is the function of

a) Quality management b) Cost management
c) Review management d) Risk management

Ans : (a)
Quality Management is one of the methods to measure quality accurately in Project Management.

93. Project planning methodologies involve

a) Planning by non-incentive and direction
b) Planning by incentive and direction
c) Unplanned initiation
d) Changing the project policies

Ans : (b)

Planning by Incentive: This could mean that project planning involves creating incentives or rewards to motivate project team members and stakeholders.

Planning by Direction: Planning by direction suggests that project planning involves providing clear guidance and direction to the project team.

94. Identify the *incorrect* statement below:

a) Project objective should be specific
b) Project objective should be realistic
c) Project objective should not be framed timely
d) Project objective should be measurable

Ans : (c)

Project objective must be specific measurable and realistic. It cannot be changed timely.

95. WBS, PEP and PPM are the tools used to design

a) Project plan b) Project work system
c) Project diary d) Project direction

Ans : (b)

Project Work system classifies into Work Breakdown Structure , Project Execution Plan , Project Procedure Manual.

96. The earliest method used for planning of project was

a) CPM b) PERT
c) Bar Chart d) Milestone Chart

Ans : (c)

The earliest method used for project planning is Bar chart.

97. The expansion of PERT is

a) Programme Evaluation and Review Technique
b) Project Estimation and Recording Tool
c) Project Estimation and Resource Technology
d) Performance Estimation and Resource Tool

Ans : (a)

PERT full form Programme Evaluation and Review Technique

98. For non-repetitive projects _____ tool is used in production planning and scheduling.

a) CPM b) PERT
c) Both CPM and PERT d) Bar Chart

Ans : (b)

For non-repetitive projects PERT is the tool used in project planning and scheduling

99. The purpose of conducting a project review is

a) To close the project
b) To initiate the project
c) To develop the project scope
d) To assess project performance

Ans : (d)

Project review will help in evaluating project performance.

100. A project review does *not* contain

a) Performance evaluation
b) Evaluating the capital budget
c) Data collection
d) Initial review

Ans : (c)

Data Collection is not the step of project review.