Set Code-4 DET-2012 (LA)

(Admission to 3rd sem of 3 yrs Diploma course)

PART–I

MATHEMATICS

1. The smallest positive integer n for which $\left(\frac{1+i}{1-i}\right)^n = 1$ is

   (A) 3

   (B) 2

   (C) 4

   (D) None of these.

2. In the expansion of $\left(x^4 - \frac{1}{x^3}\right)^{15}$, the co-efficient of x^{39} is

   (A) –455

   (B) 1365

   (C) 455

   (D) –1365

3. The total no. of terms in the expansion of $(1-2x+x^2)^{19}$ is

   (A) 20

   (B) 39

   (C) 21

   (D) 40

4. If ω is imaginary cube-roots of unity then the value of

   $$(1-\omega+\omega^2)^6 + (1-\omega^2+\omega)^6$$

   is equal to

   (A) 0

   (B) 32

   (C) 64

   (D) 128

(*Space For Rough Work*)

5. If A and B are two matrices such that $AB = B$ and $BA = A$ then $A^2 + B^2$ is equal to

(A) $2AB$

(B) $2BA$

(C) $A+B$

(D) AB

6. Let A be a square matrix of order $n \times n$ and K be a scalar. Then $|KA|$ equals

(A) $K|A|$

(B) $|K|\,|A|$

(C) $K^n|A|$

(D) None of these.

7. The value of the determinant

$$\begin{vmatrix} 11 & 12 & 13 \\ 12 & 13 & 14 \\ 13 & 14 & 15 \end{vmatrix}$$ is

(A) 1

(B) 0

(C) 134

(D) 62

8. The inverse of the matrix $\begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix}$ is

(A) $\begin{bmatrix} -1/5 & 2/5 \\ 3/5 & -1/5 \end{bmatrix}$

(B) $\begin{bmatrix} 3/5 & 2/5 \\ 1/5 & -1/5 \end{bmatrix}$

(C) $\begin{bmatrix} 1/5 & -2/5 \\ -3/5 & 1/5 \end{bmatrix}$

(D) None of these.

(*Space For Rough Work*)

(*Continued*)

9. If $\frac{2x}{(x-1)(x^2+x+1)} = \frac{A}{x-1} + \frac{Bx+C}{x^2+x+1}$ then C is

(A) $\frac{2}{3}$

(B) $\frac{1}{3}$

(C) $-\frac{2}{3}$

(D) $-\frac{1}{3}$

10. The value of

$\tan 1° . \tan 2° . \tan 3° \ldots \tan 89°$ is

(A) 0

(B) 1

(C) ∞

(D) None of these.

11. If $(1+\tan\alpha)(1+\tan\beta) = 2$, then $\alpha+\beta$ is

(A) $\frac{\pi}{6}$

(B) $\frac{\pi}{2}$

(C) $\frac{\pi}{4}$

(D) $\frac{2\pi}{3}$

12. The value of

$\cos \tan^{-1} \cot \cos^{-1} \frac{\sqrt{3}}{2}$ is

(A) $\frac{1}{\sqrt{2}}$

(B) $\frac{1}{\sqrt{3}}$

(C) 1

(D) $\frac{1}{2}$

(*Space For Rough Work*)

13. The general solution of the equation $\tan^2 x + \sec^2 x = 3$ is

(A) $n\pi \pm \frac{\pi}{2}$

(B) $n\pi \pm \frac{\pi}{4}$

(C) $n\pi \pm \frac{\pi}{3}$

(D) None of these.

14. If $\sin^{-1}\frac{x}{5} + \text{cosec}^{-1}\frac{5}{4} = \frac{\pi}{2}$, then the value of x is

(A) 2
(B) 4
(C) 3
(D) 5

15. In a triangle ABC, $A = 30°$, $B = 60°$ then $a : b : c$ is

(A) $1 : 2 : 3$
(B) $1 : \sqrt{3} : 2$
(C) $1 : 2 : \sqrt{3}$
(D) $\sqrt{3} : 2 : 1$

16. For what value of m, the points $(1, 4)$, $(2, 7)$ and $(3, m)$ are collinear

(A) 10
(B) 8
(C) -10
(D) -8

17. The slope and X-intercept of a line $3x - y + k = 0$ are equal, then the value of k is

(A) 0
(B) -1
(C) 3
(D) -9

18. The equation of a line bisecting the line segment joining the points $(a, 0)$ and $(0, b)$ at right angles is

(A) $a^2 + b^2 - 2ax - 2by = 0$
(B) $2a^2 + 2b^2 - ax - by = 0$
(C) $a^2 - b^2 - 2ax + 2by = 0$
(D) $a^2 - b^2 + 2ax - 2by = 0$

(*Space For Rough Work*)

(*Continued*)

19. The distance between the parallel lines $3x-4y+9=0$ and $6x-8y-15=0$ is

(A) $\frac{33}{10}$

(B) $\frac{10}{33}$

(C) $\frac{3}{5}$

(D) $\frac{5}{3}$

20. If p is the length of the perpendicular drawn from the origin on the line whose intercepts are a and b on the axes. Then it satisfies

(A) $a^2 + b^2 = p^2$

(B) $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{p^2}$

(C) $\frac{1}{a^2}-\frac{1}{b^2}=\frac{1}{p^2}$

(D) None of these.

21. The equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a **circle**, the condition will be

(A) $a=b$ and $c=0$

(B) $f=g$ and $h=0$

(C) $a=b$ and $h=0$

(D) $f=g$ and $c=0$

22. The radius of the circle $x^2+y^2+6x-4y-12=0$ is

(A) 1

(B) 3

(C) 4

(D) 5

(*Space For Rough Work*)

23. The centre of the sphere $2x^2 + 2y^2 + 2z^2 - 6x + 4y - 2z + 3 = 0$ lies on the plane

(A) $x - y + z - 1 = 0$

(B) $x + y + z - 1 = 0$

(C) $x + y - z - 1 = 0$

(D) None of these.

24. The equation of the plane passing through (1, 1, 2) and parallel to the plane $x + y + z - 1 = 0$ is

(A) $x + y + z = 4$

(B) $x + y + 2z = 1$

(C) $x + y - z = 2$

(D) $x + y + z = 0$

25. The equation of the circle whose centre is at the point (–2, 4) and which passes through the point $(3, -8)$ is

(A) $x^2 + y^2 + 4x - 8y - 149 = 0$

(B) $x^2 + y^2 + 8x - 4y - 169 = 0$

(C) $x^2 + y^2 - 4x + 8y + 169 = 0$

(D) None of these.

26. If α, β, γ are the angles which a directed line makes with positive direction of co-ordinate axes, then $\sin^2\alpha + \sin^2\beta + \sin^2\gamma$ is equal to

(A) 1

(B) 2

(C) 3

(D) None of these.

27. The projection of the line segment joining (1, 3, –1) and (3, 2, 4) on z-axis is

(A) 1

(B) 3

(C) 4

(D) 5

28. $\lim\limits_{x \to 0} \dfrac{1 - \cos x}{x^2}$ is

(A) $\dfrac{1}{4}$

(B) $\dfrac{1}{2}$

(C) $\dfrac{1}{8}$

(D) 1

(*Space For Rough Work*)

(*Continued*)

29. $\lim_{x \to 1} \dfrac{\sqrt{5x-4}-\sqrt{x}}{x-1}$ is

(A) 2
(B) 5
(C) 1
(D) 4

30. For what value of k, the function defined by

$$f(x)=\begin{cases}\dfrac{x^2-3x+2}{x-1}, & \text{if } x \neq 1 \\ k-2, & \text{if } x=1\end{cases}$$

is continuous at $x=1$.

(A) 2
(B) -1
(C) 1
(D) 3

31. If $y=\log[\log(\log x)]$, then $\dfrac{dy}{dx}$ is

(A) $\dfrac{1}{x \log x . \log(\log x)}$

(B) $\dfrac{1}{\log(\log x)}$

(C) $\dfrac{1}{(\log x)^2}$

(D) None of these.

32. If $Y=x^{x^{x^{\cdot^{\cdot^{\cdot^{\infty}}}}}}$, then $\dfrac{dy}{dx}$ is

(A) $\dfrac{Y^2}{X(1-Y\log x)}$

(B) $\dfrac{Y^2}{1+Y\log x}$

(C) $\dfrac{Y^2}{Y\log x}$

(D) None of these.

(*Space For Rough Work*)

33. If $x = a(\cos\theta + \theta \sin\theta)$ and $y = a(\sin\theta - \theta \cos\theta)$, then $\frac{dy}{dx}$ is

(A) $\cot\theta$

(B) $\sec\theta$

(C) $\tan\theta$

(D) $\operatorname{cosec}\theta$

34. If $\log(x^2 + y^2) = 2\tan^{-1}\left(\frac{y}{x}\right)$ then $\frac{dy}{dx}$ is

(A) $\frac{x^2 + y^2}{x^2 - y^2}$

(B) $\frac{x + y}{x - y}$

(C) $\frac{x^2 - y^2}{x^2 + y^2}$

(D) $\frac{x - y}{x + y}$

35. If $Y = A\cos nx + B\sin nx$, then $\frac{d^2y}{dx^2} + n^2y$ is

(A) 0

(B) 1

(C) $2n^2$

(D) None of these.

36. If $f(x, y, z) = x^2 + y^2 + z^2$ then $xf_x + yf_y + zf_z$ is equal to

(A) $\frac{f}{2}$

(B) f^2

(C) $2f$

(D) None of these

(*Space For Rough Work*)

(*Continued*)

37. If $f(x,y) = x^3 + y^3 - 3axy$ then $\frac{\partial^2 f}{\partial x\, \partial y}$ is

(A) $6a$

(B) $-3a$

(C) $3a$

(D) $-6a$

38. It is given that at $x = 1$, the function $f(x) = x^4 - 62x^2 + ax + 9$ attains its maximum value on $[0, 2]$. Then the value of a is

(A) 60

(B) 120

(C) –60

(D) –120

39. $\int \frac{1}{e^x - 1}\, dx$ is equal to

(A) $\log(1 - e^{-x}) + c$

(B) $\log(1 + e^{-x}) + c$

(C) $(e^x + 1) + c$

(D) $(e^x - 1) + c$

40. $\int \log x\, dx$ is equal to

(A) $\frac{1}{x} + c$

(B) $(\log x + 1) + c$

(C) $x\,(\log x - 1) + c$

(D) None of these.

41. $\int \frac{dx}{x^2 - a^2}$ is equal to

(A) $\frac{1}{2a} \log \frac{x+a}{x-a} + c$

(B) $\frac{1}{2a} \log \frac{x-a}{x+a} + c$

(C) $\frac{1}{a} \tan^{-1} \frac{x-a}{x+a} + c$

(D) None of these.

42. The value of $\int_0^{\pi/2} \frac{dx}{1 + \tan x}$ is

(A) $\frac{\pi}{4}$

(B) $\frac{\pi}{2}$

(C) 2π

(D) 1

(*Space For Rough Work*)

43. The value of $\int_{-2}^{1}(|x|+x)dx$ is

(A) 0

(B) $\frac{1}{2}$

(C) 1

(D) $-\frac{1}{2}$

44. The area of the region bounded by the curve $Y=\sin x$, $Y=0$, $X=\frac{\pi}{2}$ is

(A) 1 sq. unit

(B) $\frac{1}{4}$ sq. unit

(C) $\frac{1}{2}$ sq. unit

(D) None of these.

45. The order and degree of the differential equation

$$\frac{d^2y}{dx^2}=\left\{1+\left(\frac{dy}{dx}\right)^2\right\}^{3/2}$$ is

(A) Order-2, Degree-3

(B) Order-2, Degree-2

(C) Order-3, Degree-1

(D) Order-1, Degree-3

46. The solution of the differential equation $\frac{dy}{dx}=\frac{1+y^2}{1+x^2}$ is

(A) $x^2-y^2=c$

(B) $x^2+y^2=c$

(C) $\frac{x-y}{1+xy}=c$

(D) None of these.

(Space For Rough Work)

(Continued)

47. The differential equation of the form $M(x, y)\,dx + N(x, y)\,dy = 0$ is said to be exact if

(A) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

(B) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$

(C) $\frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x}$

(D) $\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x} = 1$

49. If $\vec{a} = \hat{i} + 2\hat{j} - \hat{k}$, $\vec{b} = \hat{i} + \hat{j} + 2\hat{k}$ and $\vec{c} = 2\hat{i} - \hat{j}$, then

(A) $\vec{a} \perp \vec{b}$

(B) $\vec{b} \perp \vec{c}$

(C) $\vec{a} \perp \vec{c}$

(D) No pair of vectors are perpendicular.

48. The area of the triangle with vertices (1, 0, 0), (0, 1, 0) and (0, 0, 1) is

(A) $\frac{1}{2}$ sq. unit

(B) 1 sq. unit

(C) $\frac{\sqrt{3}}{2}$ sq. unit

(D) 2 sq. unit

50. If $\vec{a}$ and $\vec{b}$ are two unit vectors inclined at an angle θ such that $\vec{a} + \vec{b}$ is a unit vector, then θ is equal to

(A) $\frac{\pi}{3}$

(B) $\frac{\pi}{4}$

(C) $\frac{\pi}{2}$

(D) $\frac{2\pi}{3}$

(*Space For Rough Work*)

PART–II
PHYSICS

51. The pressure of a gas is increased, but its temperature remains unchanged. The velocity of sound in the gas

(A) will increase

(B) decrease

(C) will not change

(D) will increase for some gas and decrease for other

52. Heat H is produced, when mechanical work W is done. They are related by

(A) $H = W/J$

(B) $H = WJ$

(C) $H = J/W$

(D) None of the above.

53. Which of the following has the highest penetrating power ?

(A) α-particle

(B) β-particle

(C) γ-ray photon

(D) proton

54. A planet revolves around the sun in an elliptical orbit. Its kinetic energy is

(A) maximum when it is closest to the sun

(B) maximum when it is farthest from the sun

(C) remains same at every position in the orbit

(D) zero in the orbit

(*Space For Rough Work*)

(*Continued*)

55. Which of the following statement is not true ?

(A) Ultrasonic sound have frequency beyond the limit of audibility
(B) Ultrasonic sound moves with velocity of sound
(C) Ultrasonic sounds are produced by piezoelectric generator
(D) Supersonic sound moves with the velocity of sound

56. If a wire of resistance R is stretched and its radius becomes $r/2$, its resistance will be

(A) $16\,R$
(B) $4\,R$
(C) $2\,R$
(D) $R/2$

57. The potential at a point due to a positive charge of 100 μC at a distance of 9 m is

(A) 10^4 V
(B) 10^6 V
(C) 10^5 V
(D) 10^7 V

58. Two point charges of 10 μC and - 5 μC are separated in air by 1 m. The ratio of force exerted by one on the other is

(A) 1 : 2
(B) 2 : 1
(C) 1 : 1
(D) None of the above.

(*Space For Rough Work*)

59. If the relative permeability of iron is 2000, its absolute permeability in SI units is

(A) $8\pi\times10^{-4}$ H/m

(B) $8\pi\times10^{-3}$ H/m

(C) $\frac{800}{\pi}$ H/m

(D) $\frac{5\times10^{9}}{\pi}$ H/m

60. An object is placed at a distance of 40 cm in front of a concave mirror of focal length 20 cm. The image produced is

(A) virtual, inverted and diminished

(B) real, erect and magnified

(C) real, inverted and diminished

(D) real, inverted and of the same size as the object

61. A straight wire of diameter 0.5 mm carrying a current of 1 A is replaced by another wire of 1 mm diameter carrying the same current. The magnetic field at the same distance from the wire is

(A) twice the earlier value

(B) one half of the earlier value

(C) one quarter of the earlier value

(D) remains same

62. An electric fan and a heater are marked as 100 W, 220 V and 1000 W, 220 V respectively. The resistance of heater is

(A) equal to that of fan

(B) greater than that of fan

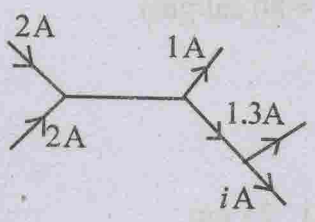
(C) lesser than that of fan

(D) zero

(*Space For Rough Work*)

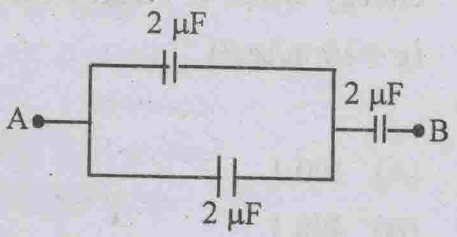
(*Continued*)

63. The figure below shows current in a part of electric circuit, then current is



(A) 1.7 A
(B) 3.7 A
(C) 1.3 A
(D) 1.0 A

64. Three capacitors each of 2μF are connected as shown below. Find the equivalent capacitance of the circuit



(A) 6 μF
(B) 2 μF
(C) 3/4 μF
(D) 4/3 μF

65. The no. of neutrons in a $_{92}U^{235}$ nucleus is

(A) 92
(B) 235
(C) 143
(D) 327

66. What will be the power of a spectacle, made by the combination of a convex lens of focal length 40 cm and a concave lens of focal length 25 cm

(A) −6.5 D
(B) −1.5 D
(C) 1.5 D
(D) 6.5 D

(*Space For Rough Work*)

67. A body of mass 20 kg falls through a height of 50 cm. What is the kinetic energy when it strikes the earth. ($g = 10$ m/sec^2)

(A) 100 J
(B) 400 J
(C) 980 J
(D) 4900 J

68. The mass of ice that can be melted by 100 gms of water at 22.4 °C is, ($L = 80$ cal/gm)

(A) 25 gm
(B) 28 gm
(C) 24 gm
(D) 18 gm

69. The coefficient of thermal conductivity of a metal depends on

(A) temperature between the two sides
(B) thickness of metal plate
(C) area of the plate
(D) None of the above factors.

70. A particle executing S.H.M. when passes through mean position has

(A) maximum potential energy
(B) maximum kinetic energy
(C) minimum kinetic energy
(D) maximum acceleration energy

(*Space For Rough Work*)

(*Continued*)

71. Which of the following quantities is dimensionless ?

(A) v^2rg
(B) v^2/rg
(C) v^2r/g
(D) v^2g/r

72. A force of 5N acts on a body of weight 9.8 N. What is the acceleration of the body ?

(A) 5 m/sec^2
(B) 1.46 m/sec^2
(C) 0.51 m/sec^2
(D) 49 m/sec^2

73. If the distance between two masses is doubled, the gravitational attraction between them is

(A) doubled
(B) four times
(C) reduced to half
(D) reduced to a quarter

74. A force F is applied on a body and it moves with a velocity v. The power of the body will be

(A) Fv^2
(B) F/v
(C) F/v^2
(D) Fv

75. An object is moving in a circular path of radius 7 m. The displacement of the object after one revolution is

(A) 7 m
(B) 22 m
(C) 44 m
(D) Zero

(*Space For Rough Work*)

PART–III
CHEMISTRY

76. The exhausted zeolite can be regenerated by passing through it a concentrated solution of

(A) $CaCl_2$
(B) $MgCl_2$
(C) $ZnCl_2$
(D) NaCl

77. Oiliness is minimum in which oil ?

(A) Mineral oils
(B) Castor oil
(C) Olive oil
(D) Palm oil

78. Which is not a thermoplastic ?

(A) Bakelite
(B) Terylene
(C) Polythene
(D) Polystyrene

79. PVC has the repeating unit of

(A) Styrene
(B) Vinyl chloride
(C) Ethylene
(D) Phenol

80. During the electrolysis of H_2SO_4 which ion is discharged at the anode ?

(A) $H^{\oplus}$
(B) $HSO_4^{\ominus}$
(C) $SO_4^{\ominus\ominus}$
(D) $OH^{\ominus}$

81. 1 Faraday is equivalent to how many coulombs ?

(A) 95600
(B) 96500
(C) 90560
(D) 90650

(Space For Rough Work)

(Continued)

82. The Chemical Formula of Ferric Sulphate is

(A) $Fr(SO_4)_2$
(B) $FeSO_4$
(C) $Fe_2(SO_4)_3$
(D) $Fe_3(SO_4)_2$

83. Give the possible values of n and l for an electron in $3p$ orbital

(A) $n=2,\ l=1$
(B) $n=1,\ l=2$
(C) $n=3,\ l=1$
(D) $n=2,\ l=3$

84. The shapes of p-orbital is

(A) Spherical
(B) Circular
(C) Trigonal
(D) Dumb-bell shaped

85. The composition of water gas is

(A) $CO+H_2$
(B) CO_2+H_2
(C) CO_2+N_2
(D) CH_4+H_2O

86. Spin quantum number is expressed by the letter

(A) S
(B) p
(C) m
(D) n

87. A variety of water which contains soluble salts of calcium and magnesium is called

(A) Heavy water
(B) Soft water
(C) Saline water
(D) Hard water

(*Space For Rough Work*)

88. Which of the following subshell can accommodate as many as 10 electrons ?

(A) 2p
(B) 3d
(C) 3s
(D) 4p

89. Nitrogen is having three unpaired electrons according to

(A) Hund's rule
(B) Aufbau principle
(C) Pauli's exclusion principle
(D) Heisenburg's uncertainty principle

90. The shape of the water molecule is

(A) Pyramidal
(B) Tetrahedral
(C) V-shaped
(D) Linear

91. In Ethyne molecule triple bond is made up of

(A) One σ bond two π bond
(B) One π bond two σ bond
(C) One metallic bond two π bond
(D) One σ bond two metallic bond

92. Dative bond present in

(A) SO_3
(B) NH_3
(C) CH_4
(D) NaCl

93. Maximum number of electrons present in 'N' shell is

(A) 18
(B) 32
(C) 2
(D) 8

(*Space For Rough Work*)

(*Continued*)

94. Which of the following has maximum calorific value ?

(A) Water gas
(B) Coal gas
(C) Producer gas
(D) Gobar gas

95. Purest form of coal is

(A) Peat
(B) Lignite
(C) Anthracite
(D) Bituminous

96. The metallurgical process in which a metal is obtained in a fused state is called

(A) Smelting
(B) Roasting
(C) Calcination
(D) Froath flotation

97. The substance which is added to ores to remove the impurities is known as

(A) Slag
(B) Flux
(C) Gangue
(D) Catalyst

98. Coke is a pure variety of carbon which contains

(A) 60% C
(B) 50% C
(C) 80-95% C
(D) 70-80% C

99. Ozone layer depletion in the stratosphere is mainly caused by

(A) SO_2
(B) SO_3
(C) H_2S
(D) CFCs

100. SO_2 gas is a dangerous air pollutant and harms plant life by

(A) Darkening of the leaves
(B) Withering of the leaves
(C) Falling leaves
(D) Bleaching of the leaves

(Space For Rough Work)

DET-2012 (LA) SET-code - 4

(Admisim into 3rd semester of 3 yrs Diploma course)

LATERAL ENTRY

SET-4	
Q.No.	Answer
1	C
2	A
3	B
4	D
5	C
6	C
7	B
8	A
9	A
10	B
11	C
12	D
13	B
14	C
15	B
16	A
17	D
18	C
19	A
20	B
21	C
22	D
23	B
24	A
25	A
26	B
27	D
28	B
29	A
30	C
31	A
32	A
33	C
34	B
35	A
36	C
37	B
38	B
39	A
40	C
41	B
42	A
43	C
44	A
45	B
46	C
47	A
48	C
49	C
50	D

16/5/2012

Set-code-4

DET-2012 (LA)

(Admisim into 3rd semester of three years Diploma course)

LATERAL ENTRY

Answer SET-4	
Q.No.	Answer
51	C
52	A
53	C
54	A
55	D
56	A
57	B
58	C
59	A
60	D
61	D
62	C
63	A
64	D
65	C
66	B
67	A
68	B
69	D
70	B
71	B
72	A
73	D
74	D
75	D
76	D
77	A
78	A
79	B
80	A
81	A
82	C
83	C
84	D
85	A
86	A
87	D
88	B
89	A
90	C
91	A
92	A
93	B
94	B
95	C
96	A
97	B
98	C
99	D
100	D

16/5/2012