**(Booklet Number)**

**Duration : 2 Hours**

**Full Marks : 100**

## INSTRUCTIONS

1.  All questions are of objective type having four answer options for each. Only one option is correct. Correct answer will carry full marks 1. In case of incorrect answer or any combination of more than one answer, ¼ marks will be deducted.

2.  Questions must be answered on OMR sheet by darkening the appropriate bubble marked
    A, B, C or D.

3.  Use only **Black/Blue ball point pen** to mark the answer by complete filling up of the respective bubbles.

4.  Mark the answers only in the space provided. Do not make any stray mark on the OMR.

5.  Write question booklet number and your roll number carefully in the specified locations of the **OMR**. Also fill appropriate bubbles.

6.  Write your name (in block letter), name of the examination centre and put your full signature in appropriate boxes in the OMR.

7.  The OMR is liable to become invalid if there is any mistake in filling the correct bubbles for question booklet number roll number or if there is any discrepancy in the name/signature of the candidate, name of the examination centre. The OMR may also become invalid due to folding or putting stray marks on it or any damage to it. The consequence of such invalidation due to incorrect marking or careless handling by the candidate will be sole responsibility of candidate.

8.  Candidates are not allowed to carry any written or printed material, calculator, pen, docu-pen, log table, wristwatch, any communication device like mobile phones etc. inside the examination hall. Any candidate found with such items will be **reported against** & his/her candidature will be summarily cancelled.

9.  Rough work must be done on the question paper itself. Additional blank pages are given in the question paper for rough work.

10. Hand over the OMR to the invigilator before leaving the Examination Hall.

**Agriculture Engg.-2019**

# MATHEMATICS

1. Choose the correct one:

   (A) Every non-singular matrix is orthogonal.

   (B) Every orthogonal matrix is invertible.

   (C) Every orthogonal matrix is symmetric.

   (D) Every orthogonal matrix is skew symmetric.

2. If $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$, then $A^{100}$ is equal to

   (A) $2^{100}.A$

   (B) $2^{99}.A$

   (C) $100A$

   (D) $99A$

3. If $\alpha = \begin{vmatrix} a+b & b+c & c+a \\ b+c & c+a & a+b \\ c+a & a+b & b+c \end{vmatrix}$ and $\beta = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$ then

   (A) $\alpha = \beta$

   (B) $\alpha = 2\beta$

   (C) $\beta = 2\alpha$

   (D) $\alpha = \beta + abc$

4. The matrix $A = \frac{1}{3} \begin{bmatrix} a & 2 & 2 \\ 2 & 1 & b \\ 2 & c & 1 \end{bmatrix}$ obeys $AA^T = I_3$.

   Then

   (A) $a = b = c = 1$

   (B) $a = 1, b = c = -2$

   (C) $a = 2, b = 1, c = -1$

   (D) $a = 0, b = 1, c = 2$

5. If $\vec{a}.\vec{b} = \vec{b}.\vec{c} = \vec{c}.\vec{a} = 0$, then $\vec{a}.(\vec{b} \times \vec{c}) =$

   (A) a non-null vector

   (B) $1$

   (C) $-1$

   (D) $|\vec{a}||\vec{b}||\vec{c}|$

6. The position vector of the points A. B, C, D are $\hat{i} + \hat{j} + \hat{k}$, $2\hat{i} + 3\hat{j}$, $3\hat{i} + 5\hat{j} - 2\hat{k}$ and $\hat{k} - \hat{j}$ respectively.

Then $\overrightarrow{AB}$ and $\overrightarrow{CD}$ are

(A) perpendicular to each other      (B) parallel to each other

(C) inclined at an angle 60°      (D) inclined at an angle 45°

7. If $u = \dfrac{x^2 + y^2}{\sqrt{x + y}}$ then $x \dfrac{\partial u}{\partial x} + y \dfrac{\partial u}{\partial y} = ku$. where k –

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

(C) $\dfrac{3}{2}$      (D) 1

8. If $H = f(y - z, z - x, x - y)$, then $\dfrac{\partial H}{\partial x} + \dfrac{\partial H}{\partial y} + \dfrac{\partial H}{\partial z} =$

(A) 0      (B) f

(C) 2f      (D) $\dfrac{1}{2} f$

9. $f(x, y) = \sin^{-1}\dfrac{y}{x} + \tan^{-1}\dfrac{x}{y}$, then $xf_x + yf_y$ is

(A) 1      (B) 2

(C) 3      (D) 0

10. The order of the differential equation associated with the parametric equation $y = A + B \log_e x$, where A and B are parameters. is

(A) 4      (B) 3

(C) 2      (D) 1

11. The integral curve of the differential equation $(y - x) \dfrac{dy}{dx} = 1$, passes through $(0, 0)$ and $(\alpha, 1)$.

Then $\alpha =$

(A)  $2 - e^{-1}$

(B)  $1 - e^{-1}$

(C)  $e^{-1}$

(D)  $1 + e$

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

(A)  $y = \tan^{-1} x + c$

(B)  $y - x = c(1 + xy)$

(C)  $x = \tan^{-1} y + c$

(D)  $\tan xy = c$

(where c is arbitrary constant)

13. Integrating factor of the differential equation $\cos x \dfrac{dy}{dx} + y \sin x = 1$ is

(A)  $\cos x$

(B)  $\tan x$

(C)  $\sec x$

(D)  $\sin x$

14. The complementary function of $\dfrac{d^2 y}{dx^2} + 4y = 2e^x$ is

(A)  $Ae^{2x} + Be^{-2x}$

(B)  $A \cos x + B \sin x$

(C)  $Ae^x + Be^{-x}$

(D)  $A \cos 2x + B \sin 2x$

15. Three integers are chosen at random from the first 20 integers. The probability that their product is even, is

(A)  $\dfrac{2}{19}$

(B)  $\dfrac{17}{19}$

(C)  $\dfrac{3}{19}$

(D)  $\dfrac{4}{19}$

16. Events A. B, C are mutually exclusive such that $P(A) = \frac{3x+1}{3}$, $P(B) = \frac{1-x}{4}$, $P(C) = \frac{1-2x}{2}$. Then x lies in the interval

(A) $[0, 1]$

(B) $\left[\frac{1}{3}, \frac{2}{3}\right]$

(C) $\left[\frac{1}{3}, \frac{1}{2}\right]$

(D) $\left[\frac{1}{3}, \frac{13}{3}\right]$

17. Taking n=4, by Simpson's 1/3rd rule, the approximate value of $\int_0^4 2^x \, dx =$

(A) $\frac{64}{3}$

(B) $\frac{62}{3}$

(C) $\frac{61}{3}$

(D) $\frac{65}{3}$

18. The root upto the first approximation of the equation $x^3 + 2x - 1 = 0$ in $(0, 1)$ by Regula Falsi method is given by

(A) 1

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

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

(D) $\frac{1}{4}$

19. The value of $\sqrt{3}$ correct to two decimal places by bisection method is

(A) 1.63

(B) 1.65

(C) 1.64

(D) 1.62

20. $(1 + \Delta)(1 - \nabla) \equiv$

(A) 0

(B) 1

(C) $\Delta - \nabla$

(D) $\nabla - \Delta$

[With usual symbols]

## ELECTRICAL TECHNOLOGY

21. Kirchhoff's laws are valid for
    (A) linear circuits only
    (B) non-linear circuits only
    (C) neither linear nor non-linear circuits
    (D) both linear and non-linear circuits

22. A delta connection of resistances contains three equal impedances of 60 Ω. The impedance of each arm of the equivalent star connection will be
    (A) 15 Ω                           (B) 20 Ω
    (C) 30 Ω                           (D) 40 Ω

23. The reactance offered by a capacitor to an alternating current of frequency 50 Hz is 20 Ω. What will be the reactance if the frequency is increased to 100 Hz ?
    (A) 2.5 Ω                          (B) 5 Ω
    (C) 10 Ω                           (D) 15 Ω

24. Laminated cores are used in power transformers to reduce
    (A) eddy loss                      (B) hysteresis loss
    (C) copper loss                    (D) current loss

25. A capacitor start, capacitor run single phase induction motor is basically a
    (A) AC series motor                (B) DC series motor
    (C) 2 phase induction motor        (D) 3 phase induction motor

26. A motor can be easily identified as a DC motor by looking at its
    (A) frame                          (B) shaft
    (C) commutator                     (D) stator

27. Direct-on-line starters are not suggested for starting large DC motors because
    (A) the motor may run away
    (B) the starting torque becomes very low
    (C) the motor may start in reverse direction
    (D) the starting current will be enormously high

28. Conductivity is analogous to

   (A)  retentivity                    (B)  resistivity

   (C)  permeability                 (D)  inductance

29. Which of the following is not a standard voltage for transmission of electrical power ?

   (A)  132 KV                        (B)  66 KV

   (C)  33 KV                         (D)  20 KV

30. The braking system of energy meter basically consists of a

   (A)  mechanical brake          (B)  plugging brake

   (C)  regenerative brake         (D)  permanent magnet

31. Which of the following is an integrating instrument ?

   (A)  Ammeter                      (B)  Voltmeter

   (C)  Galvanometer              (D)  Energy meter

32. The power factor of an R-C circuit is

   (A)  often zero                    (B)  between 0 and 1

   (C)  always 1                      (D)  between 0 and -1

33. SMPS is used for

   (A)  obtaining controlled AC power supply

   (B)  obtaining controlled DC power supply

   (C)  storing DC power

   (D)  controlled switching between various power supplies

34. Colour code for the phase and the neutral in 230 V AC supply is

   (A)  Black and green             (B)  Red and green

   (C)  Red and black               (D)  Red and blue

35. Illumination level required for precision work is of the order of

   (A)  20 to 50 lm/m$^2$           (B)  50 to 100 lm/m$^2$

   (C)  150 to 200 lm/m$^2$         (D)  500 to 1000 lm/m$^2$

## COMPUTER APPLICATION

36. Information about the first partition of the logical-address space of a process is kept in the

 (A) global descriptor table
 (B) local descriptor table
 (C) page table
 (D) process control block

37. The performance of cache memory is frequently measured in terms of a quantity called

 (A) page fault
 (B) page replacement
 (C) hit ratio
 (D) number of bits per track

38. A typical file control block does not contain

 (A) file permissions
 (B) file size
 (C) file data blocks
 (D) file name

39. What is the 9's complement form of $(12389)_{10}$ ?

 (A) 87610
 (B) 87611
 (C) 110011
 (D) None of these

40. The equivalent octal number of the hexadecimal number F3A7C2 is

 (A) $(74723702)_8$
 (B) $(74723802)_8$
 (C) $(74723700)_8$
 (D) $(74728702)_8$

41. The equivalent binary number of $(0.6975)_{10}$ is

 (A) $(0.1101)_2$
 (B) $(0.1100)_2$
 (C) $(0.1011)_2$
 (D) $(0.1001)_2$

42. After compilation of C program, we get the

 (A) object file
 (B) executable file
 (C) binary file
 (D) pdf file

43. In first pass, the assembler reads the program to collect symbols defined with offsets in a

 (A) Program control table
 (B) page table
 (C) hash table
 (D) symbol table

44. Identify the true statement from the following sentences:

    (A) Multi-user operating systems depend upon computer systems with special hardware that permits different processors to be assigned to different users.

    (B) Text-based user interfaces are easier to use, though less powerful than graphic user interfaces.

    (C) "Context switching" means that the OS causes the processor to divide its attention between a series of different user processes.

    (D) Virtual memory expands the amount of space allowed for storing data and instructions by dedicating special cache memory units to hold this information temporarily.

45. Which is **not** the multitasking operating system ?

    (A) Windows 2000                (B) MS-DOS

    (C) Windows XP                  (D) Windows NT

46. A program that accepts a symbolic language program and produces its binary machine language equivalent is called

    (A) an assembler                (B) an interpreter

    (C) an application software      (D) a compiler

47. What is the output of the following program ?

        #include <stdio.h>
        main()
        {int a,b:
        a= -3 - -3:
        b= -3 - - (-3):
        printf("a=%d b=%d",a,b): }

    (A) error                       (B) a = 0, b = - 6

    (C) a = 1, b = - 5              (D) a = 0, b = 6

48. A do-while loop is used when we want that the statements within the loop must be executed:

    (A) at least once               (B) more than once

    (C) only once                   (D) infinite times

49. Add the missing statement for the following program to print 45 :
```
#include <stdio.h>
main()
{ int j. *ptr:
*ptr = 45;
printf(\n%d", j);}
```
(A) *ptr = *j            (B) ptr = &j
(C) ptr = *j            (D) &ptr = &*j

50. What is the output of this C code ?
```
#include <stdio.h>
main()
{
        printf( "%c". "abcdefgh"[4]):
}
```

(A) d            (B) No output will be printed
(C) e            (D) Run Time Error

51. A cable interconnects twenty computers and two printers in a single office so that users can share the printers. This configuration is an example of a
(A) MAN            (B) WAN
(C) LAN            (D) VPN

52. Which layer handles the creation of data frames ?
(A) physical            (B) data link
(C) session            (D) transport

53. A device operating at the network layer is called a
(A) Bridge            (B) Router
(C) Hub            (D) Repeater

54. For electronic mail transmission we need
(A) FTP            (B) HTTP
(C) SMTP            (D) TCP IP

55. HTTP server uses the port number
(A) 20            (B) 40
(C) 23            (D) 80

## ENVIRONMENTAL ENGINEERING

56. Which of the following is not included in Environmental Auditing ?

    (A) Pollution monitoring schemes

    (B) Storage of toxic chemicals

    (C) Scrutiny by the government agencies

    (D) Safety provisions for industrial works

57. CFC-11 is

    (A) $CF_3Cl$

    (B) $CFCl_3$

    (C) $CF_2Cl_2$

    (D) $CHCl_3$

58. For air stability, we must have

    (A) Dry adiabatic lapse rate = Ambient lapse rate

    (B) Dry adiabatic lapse rate > Ambient lapse rate

    (C) Dry adiabatic lapse rate < Ambient lapse rate

    (D) Both (A) & (C)

59. The pollutant primarily responsible for photochemical smog is

    (A) Water vapour

    (B) Sulphur dioxide

    (C) Oxides of nitrogen

    (D) Ozone

60. Chernobyl nuclear disaster occurred on

    (A) 26th April, 1986

    (B) 28th November, 1987

    (C) 17th June, 1977

    (D) 5th January, 1999

61. There are two samples of water. Sample 1 has BOD 50 mg/lit and Sample 2 has BOD 30 mg/lit. Then

    (A) The degree of pollution is same in both the samples

    (B) Sample 1 is more polluted than sample 2

    (C) Sample 2 is more polluted than sample 1

    (D) No inference can be drawn on the degree of pollution

62. Organomercury is an example of

    (A) Fungicide

    (B) Fumigant

    (C) Antibiotic

    (D) Rodenticide

63. COD test is more scientific than BOD test because
    (A) It is related to the microorganisms
    (B) It is not related to the microorganisms
    (C) It is related to oxidizing chemicals
    (D) It is related to both microorganisms and oxidizing chemicals

64. The main chemical responsible for hematotoxicity is
    (A) $NO_2$                    (B) $CO_2$
    (C) $SO_2$                    (D) $CO$

65. Which one of the following methods would be the best suited for disposal of plastic and rubber waste ?
    (A) Composting                (B) Pyrolysis
    (C) Incineration              (D) Sanitary landfill

66. Composting is suitable
    (A) for stable organic matters    (B) at low temperatures
    (C) in absence of moisture content    (D) in all the above conditions

67. Full form of ESP is
    (A) Electrostatic Precipitator    (B) Electrostatic Producer
    (C) Electrostatic source Precipitator    (D) Electrostatic Production

68. In residential area permissible noise level standard during Night time (9 p.m. to 6 a.m.) is
    (A) 45 dBA                    (B) 55 dBA
    (C) 65 dBA                    (D) 75 dBA

69. Montreal protocol is related with
    (A) Water pollution           (B) Use of CFCs
    (C) Phosphate                 (D) Carbonate

70. Aircraft noise is measured by
    (A) $L_{epn}$                 (B) $L_{eq}$
    (C) $L_{10}$ (18hrs) index    (D) Decibel

## SOIL & WATER ENGINEERING

71. Dug wells must be deep enough to extend about _____ metre below the water table in dry weather.

   (A)  2-4                            (B)  4-10

   (C)  10-15                          (D)  15-20

72. Unit hydrograph is used to estimate the run-off from a

   (A)  command area                  (B)  forest

   (C)  watershed                     (D)  cropping area

73. Drip irrigation is preferred for _____ cultivation.

   (A)  potato                        (B)  jute

   (C)  mustard                       (D)  apple

74. Strength of cement concrete depends on

   (A)  quality of water              (B)  quality of sand

   (C)  quality of aggregate          (D)  water-cement ratio

75. The instrument used for measuring evapotranspiration is

   (A)  lysimeter                     (B)  infiltrometer

   (C)  solarimeter                   (D)  rain gauge

76. The term 'time of concentration' is associated with

    (A) irrigation efficiency

    (B) open channel drainage

    (C) pumping efficiency

    (D) watershed

77. Hydraulic structures are built for preventing

    (A) water ponding

    (B) soil erosion

    (C) infiltration

    (D) high air velocity in watershed

78. The suction head of a centrifugal pump should not be more than _____ metre.

    (A) 7

    (B) 12

    (C) 16

    (D) 21

79. If the land area has uniform slope towards one direction, the contour lines will be

    (A) semi-circular

    (B) concentric

    (C) parallel

    (D) undefined

80. If the water inside the aquifer remains under pressure, it is called

    (A) unconfined aquifer

    (B) volcanic aquifer

    (C) saturated aquifer

    (D) confined aquifer

## FARM MACHINERY & POWER

81. Fuel injector is present in

    (A) 2-stroke SI engine

    (B) 4-stroke CI engine

    (C) 4-stroke SI engine

    (D) external combustion engine

82. The mechanical efficiency of the diesel engine lies in the range of

    (A) 80-90%

    (B) 60-70%

    (C) 40-50%

    (D) 20-30%

83. Differential is provided in the tractor to facilitate

    (A) field operation

    (B) straight movement

    (C) turning

    (D) proper hitching of implements

84. In diesel engine, fuel is injected inside the cylinder at

    (A) 15-30 degree after BDC

    (B) 15-30 degree after TDC

    (C) 15-30 degree before BDC

    (D) 15-30 degree before TDC

85. Vertical suction in mould board plough is provided to

    (A) maintain uniform width of cut

    (B) pulverize the soil

    (C) reduce the tool vibration

    (D) maintain uniform depth of cut

86. The function of the reel of a combine is to

    (A) feed the crops to the cutter bar

    (B) feed the cut crop to the threshing unit

    (C) act as a beater

    (D) feed the straw to the straw-walker

87. Off-set type disc harrow has

    (A) one gang                      (B) two gangs

    (C) three gangs                   (D) four gangs

88. The operational pressure of a hydraulic sprayer should not be less than _____ kPa.

    (A) 60                            (B) 100

    (C) 140                           (D) 670

89. Conversion efficiency of commercial solar cell is

    (A) 0-5%                          (B) 10-15%

    (C) 15-25%                        (D) 25-35%

90. For anaerobic digestion. optimum solid content of cow dung slurry is

    (A) 8-9%                          (B) 12-15%

    (C) 15-20%                        (D) 20-25%

## FOOD PROCESSES & POST HARVEST ENGINEERING

91. Size reduction is performed by the mechanism of

    (A) crushing                    (B) impact

    (C) shearing                    (D) All (A). (B) and (C)

92. Fodder stored in air tight trench silo is known as

    (A) silage                      (B) hay

    (C) moist fodder                (D) concentrate

93. Most of the drying operations are based on

    (A) conduction                  (B) convection

    (C) radiation                   (D) centrifugation

94. Separation by screening is performed by the property

    (A) shape                       (B) density

    (C) texture                     (D) size

95. The particle density of a material is 2.0 g/cc and its porosity is 40%. The bulk density of the material in g/cc is

    (A) 0.80                        (B) 1.43

    (C) 3.33                        (D) 5.00

96. The cyclone separator works on the principle of

    (A)   centrifugal force                 (B)   gravitational force

    (C)   hydraulic pressure                 (D)   Both (A) and (B)

97. The main disadvantage of hard water is.

    (A)   bad taste                          (B)   foul smell

    (C)   increased soap consumption         (D)   more turbidity

98. For safe food storage at normal temperature, the pH of the product should be about

    (A)   5                                  (B)   7

    (C)   9                                  (D)   11

99. The temperature and holding time for pasteurization is

    (A)   61 °C, 20 min                      (B)   70 °C, 15 min

    (C)   70 °C, 15 sec                      (D)   90 °C, 15 sec

100. Dehusking of paddy is recommended by

    (A)   rubber roll dehusker               (B)   centrifugal dehusker

    (C)   Engelburg dehusker                 (D)   gyratory crusher