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400153

Series : **a**

Question Booklet No.

Invigilator's Signature

ESE/25/RT/AGE/2025

AGRICULTURAL ENGINEERING

Candidate's Signature

Time : 3 Hours **Maximum Marks : 200**

ROLL NO. | | | | | | |

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1. Air standard efficiency of a cyclic process is the

[A] ratio of work transfer to heat transfer

[B] difference between heat transfer and work transfer

[C] sum of heat transfer and work transfer

[D] multiplication of heat transfer and work transfer

2. Which law of thermodynamics is the basis of temperature measurement?

[A] First law of thermodynamics

[B] Second law of thermodynamics

[C] Zeroth law of thermodynamics

[D] Perpetual motion machine of the first kind

3. The area of the indicator diagram represents the magnitude of the _____ by the system in one engine cycle.

[A] power

[B] pressure

[C] volume

[D] work

4. The unit of entropy in standard symbol is

[A] J/K

[B] J/kg-K

[C] J

[D] K

5. A pure liquid at a given pressure will transform into vapour only at a particular temperature known as

[A] stagnation temperature

[B] saturation temperature

[C] absolute temperature

[D] critical temperature

6. For same compression ratio, the efficiency of diesel cycle is _____ the Otto cycle.

[A] more than

[B] less than

[C] equal to

[D] None of the above

7. Antifreeze agent used as a coolant of an internal combustion engine, is

[A] alcohol

[B] Tetraethyl Lead (TEL)

[C] methylene glycol

[D] ethylene glycol

8. The main purpose of lubrication system in an IC engine is to

[A] reduce friction

[B] cool the engine

[C] reduce fuel consumption

[D] reduce vibration

9. Piston displacement of engine is directly proportional to

[A] length of stroke

[B] power of engine

[C] stroke-bore ratio

[D] compression ratio

10. The function of a carburetor in spark ignition engine is to

[A] electronically control fuel injection timing

[B] regulate exhaust emission by catalytic converter

[C] compress air fuel mixture in turbocharged engine

[D] atomize fuel and mix with air at desired ratio

11. One of the main advantages of disc brake over the drum brake is that the disk brake

[A] has better performance

[B] weighs less than the drum brake

[C] requires less pedal force to stop the tractor

[D] is cheaper than the drum brake

12. Moving center of gravity of a tractor towards its front wheel creates the problem of

[A] instability

[B] overturning

[C] steering

[D] fuel consumption

13. Battery in a tractor is charged by

[A] starter

[B] flywheel

[C] dynamo

[D] relay

14. The law of differential in a tractor is that

[A] torque is equal in both axles

[B] power is equal in both axles

[C] speed is equal in both axles

[D] All of the above

15. The unit of a combine harvester responsible for cutting the crop is

[A] concave and cylinder

[B] header

[C] tailing board

[D] straw walker

16. Working element of power operated paddy thresher is

[A] rasp bar

[B] spike tooth

[C] angle iron bar

[D] syndicator type

17. Power tillers are ***not*** generally employed for draft application because of

[A] low horse power

[B] low speed

[C] low coefficient of traction

[D] non-availability of matching implement

18. In hydraulic sprayers, the degree of atomization is primarily a function of

[A] liquid pressure and nozzle characteristics

[B] air velocity

[C] shape and size of atomizer

[D] speed of the disc

19. In a tractor drawn disc plough, the type of bearing used is

[A] ball bearing

[B] taper roller bearing

[C] split bearing

[D] needle bearing

20. Seed metering devices of seed drills include

[A] plates with cells

[B] belts with holes

[C] pneumatic suction pipes

[D] fluted rollers

21. Breakage of grain in a thresher depends upon

[A] speed of blower

[B] number of sieves

[C] cylinder-concave clearance

[D] length of chute

22. The mould board of a mould plough is made up of

[A] malleable iron

[B] forged steel

[C] soft-centered steel

[D] mild steel

23. For a given spray sample

[A] the Volume Median Diameter (VMD) is equal to Number Median Diameter (NMD)

[B] the VMD is less than NMD

[C] the VMD is larger than NMD

[D] None of the above

24. By increasing the wind speed two times, power generation will be _____ in a wind mill.

[A] constant

[B] doubled

[C] increased four fold

[D] increased eight fold

25. Which of the following processes is used for generation of biogas from cow dung?

[A] Aerobic digestion

[B] Anaerobic digestion

[C] Fermentation

[D] Pyrolysis

26. The primary material used for manufacturing of solar cell is

[A] steel

[B] silicon

[C] cadmium

[D] arsenic

27. Solar energy can be converted into

[A] thermal energy

[B] electrical energy

[C] magnetic energy

[D] thermal and electrical energy

28. Greenhouse gases are

[A] carbon dioxide, methane and nitrous oxide

[B] ammonia, carbon dioxide and nitrous oxide

[C] methane, nitrous oxide and hydrogen sulphide

[D] carbon dioxide, methane and ammonia

29. Which of the following is used to produce bio-ethanol by fermentation in large scale?

[A] Acid

[B] Rice

[C] Molasses

[D] Alcohol

30. Which of the following statements is ***wrong***?

[A] Value of dry basis moisture content is more than the wet basis moisture content

[B] Value of wet basis moisture content is more than the dry basis moisture content

[C] Dynamic principles of drying are governed by heat and mass transfer laws

[D] Thermal diffusivity is used to determine the heat transfer rates in solid agricultural products of any shape

31. Which of the following lines is ***not*** present in psychometric chart?

[A] Absolute humidity

[B] Adiabatic saturation lines

[C] Enthalpy

[D] Partial pressure of water vapour

32. The process of heat transfer from one particle of fluid to another by the actual movement of the fluid particles caused by some mechanical means is known as

[A] conduction

[B] free convection

[C] forced convection

[D] radiation

33. In transient heat transfer problems, the dimensionless number used is

[A] Nusselt number

[B] Prandtl number

[C] Biot number

[D] Schmidt number

34. The diffusion coefficient in Fick's law represents

[A] the rate at which a substance diffuses

[B] the concentration gradient

[C] the driving force for diffusion

[D] a measure of how easily a substance diffuses through a medium

35. Log Mean Temperature Difference (LMTD) in case of counter-flow heat exchanger as compared to parallel flow heat exchanger is

[A] greater

[B] lower

[C] same

[D] greater or lower

36. Which of the following is ***not*** a type of mass transfer operation?

[A] Absorption

[B] Distillation

[C] Heat conduction

[D] Extraction

37. Rice milling process does ***not*** include

[A] dehusking

[B] polishing

[C] parboiling

[D] cleaning

38. Homogenization is a

[A] chemical process

[B] biological process

[C] thermal process

[D] mechanical process

39. In drying of food grains, the constant rate of drying is directly proportional to

[A] convective heat transfer coefficient

[B] latent heat of vaporization

[C] wet bulb temperature

[D] dry bulb temperature

40. Machine used for dehusking of pulses is

[A] rubber roll dehusker

[B] emery roll dehusker

[C] centrifugal dehusker

[D] underrunner disc sheller

41. The sequence of components in the vapour compression refrigeration system is

[A] compressor, condenser, evaporator, expander

[B] compressor, condenser, expander, evaporator

[C] compressor, expander, condenser, evaporator

[D] compressor, evaporator, condenser, expander

42. Size of irregular shaped food grains is represented by

[A] mean diameter

[B] median diameter

[C] perimeter

[D] equivalent diameter

43. Which of the following is ***correct*** for sterilization and pasteurization?

[A] Sterilization uses lower temperatures

[B] Pasteurization destroys spores

[C] Sterilization is done for small time as compared to pasteurization

[D] Pasteurization destroys all microorganisms

44. Which of the following materials is used for preservation of food grains at home?

[A] Neem leaves

[B] Curry leaves

[C] Tulsi leaves

[D] Amla leaves

45. The gases used in modified and controlled atmosphere for storage of grains are

[A] neon and argon

[B] nitrogen and oxygen

[C] nitrogen and carbon dioxide

[D] carbon monoxide and carbon dioxide

46. Silo is used for the storage of

[A] fruits

[B] grains

[C] onions and potatoes

[D] vegetables

47. Sealed storage can be effectively fumigated using

[A] aldrin and dieldrin

[B] chlordane and heptachlor

[C] lindane and ethyl mercury chloride

[D] methyl bromide and phosphine

48. Which packaging material is used for resistance to moisture and gases?

[A] Aluminum

[B] Plastic

[C] Paper

[D] Steel

49. What is the term for the process of storing food at temperatures below 0°C but without the formation of ice crystals?

[A] Deep freezing

[B] Superchilling

[C] Blast freezing

[D] Chilling injury

50. Which type of conveyor system is suitable for moving grains vertically up?

[A] Roller conveyor

[B] Chain conveyor

[C] Belt conveyor

[D] Bucket elevator

51. Fundamental equation that relates the pressure, fluid speed and height of flow is

[A] continuity equation

[B] Bernoulli's equation

[C] Reynolds equation

[D] Darcy's equation

52. Characteristics of flow in a pipe is determined by

[A] Reynolds number

[B] Froude number

[C] Prandtl number

[D] Weber number

53. Manning equation written in standard symbols is

[A] $v = \frac{R^{2/3}S^{1/2}}{n}$

[B] $v = \frac{R^{1/2}S^{2/3}}{n}$

[C] $v = \frac{RS}{n}$

[D] $v = \frac{RS^{1/2}}{n}$

54. Flow of water in an open channel is generally measured with

[A] orifice meter

[B] venturimeter

[C] weir

[D] rotameter

55. For the most efficient hydraulic section of a rectangular channel, the bottom width is

[A] equal to the depth

[B] equal to half the depth

[C] equal to one and half times of the depth

[D] equal to two times the depth

56. Slope of a Cippoletti weir is

[A] 1H : 4V

[B] 4H : 1V

[C] 4%

[D] 4 in 1

57. In open channel flow

[A] flow is not influenced by gravity

[B] flow is influenced by shape and roughness of channel

[C] pressure drives the flow

[D] Reynolds number is used to calculate critical flow

58. Which of the following instruments is ***not*** used to set out right angle to a chain line?

[A] Cross-staff

[B] Optical square

[C] Prism square

[D] Ranging rod

59. The area on a contour map is measured by using

[A] area meter

[B] clinometer

[C] planimeter

[D] graphometer

60. In chain survey, main station should be selected such that it divides the whole area into _____ triangles.

[A] obtuse-angled

[B] right-angled

[C] isosceles

[D] well-conditioned

61. The length of a chain is measured from

[A] centre of one handle to centre of another handle

[B] outside of one handle to outside of another handle

[C] inside of one handle to outside of another handle

[D] inside of one handle to inside of another handle

62. Very close contour lines in a map show

[A] gentle slope on the ground

[B] steep slope on the ground

[C] flat surface on the ground

[D] undulating surface on the ground

63. The bearing of a line is also known as

[A] true bearing

[B] azimuth

[C] magnetic bearing

[D] reduced bearing

64. A fixed point of reference of known elevation is called

[A] benchmark

[B] chance point

[C] datum

[D] station point

65. The difference between liquid limit and plastic limit is known as

[A] plasticity index

[B] consistency index

[C] shrinkage index

[D] density index

66. Darcy's law is valid for

[A] laminar flow

[B] transient flow

[C] turbulent flow

[D] all types of flow

67. The minimum water content in a soil at which the soil just begins to crumble when rolled into 3 mm diameter thread is known as

[A] liquid limit

[B] plastic limit

[C] shrinkage limit

[D] permeability limit

68. Which of the following is ***correct*** for cohesion?

[A] It decreases as the moisture content increases

[B] It increases as the moisture content decreases

[C] It is more in compacted clay soil

[D] It depends upon the external applied load

69. Quicksand is

[A] fine textured sand

[B] a flow condition occurring within a cohesionless soil

[C] quick flow of water from upward to downward

[D] the flow of water in sand under high effective pressure

70. Which of the following is an ***incorrect*** statement in Mohr's strength theory?

[A] Material fails essentially by shear

[B] Ultimate strength of a material is determined by stresses in the potential failure plane

[C] Failure criterion is independent of intermediate principal stress

[D] Shear stress is the exponential function of normal stress

71. The relationship between specific gravity (G), void ratio (e) and hydraulic gradient (i) can be written as

[A] $i = \frac{G+1}{1+e}$

[B] $i = \frac{G-1}{1-e}$

[C] $i = \frac{G+1}{1-e}$

[D] $i = \frac{G-1}{1+e}$

72. The equation $A = R \times K \times LS \times C \times P$ is used to compute (Standard term is used in the equation)

[A] erodibility factor

[B] average annual soil loss

[C] erosivity factor

[D] average annual runoff

73. Sheet erosion is a form of

[A] landslide

[B] wind erosion

[C] water erosion

[D] both wind and water erosion

74. Rill erosion is a transition stage between

[A] splash erosion and sheet erosion

[B] sheet erosion and gully erosion

[C] splash erosion and gully erosion

[D] wind erosion and water erosion

75. The movement of soil particles having sizes in the range of 0·05 to 0·5 mm through a series of bounces is known as

[A] surface creep

[B] surface transportation

[C] saltation

[D] suspension

76. Which of the following is ***not*** a permanent gully control structure?

[A] Contour bund

[B] Drop spillway

[C] Chute spillway

[D] Drop inlet spillway

77. Which type of water erosion forms small, shallow channels that can be removed by tillage?

[A] Rill erosion

[B] Gully erosion

[C] Sheet erosion

[D] Splash erosion

78. Contour bund is a bund laid on

[A] boundary of the field

[B] line joining the points of equal heights

[C] lines parallel to each other

[D] lines perpendicular to each other

79. Shelterbelt is one of the techniques to control

[A] sheet erosion

[B] gully erosion

[C] rill erosion

[D] wind erosion

80. Evapotranspiration in a crop field surrounded by dry fallow land will be higher than that surrounded by vegetation due to

[A] conduction of heat

[B] convection of heat

[C] oasis effect

[D] clothesline effect

81. A plot of rainfall intensity versus time is called a

[A] hydrograph

[B] mass curve

[C] hyetograph

[D] isohyet

82. Which of the following is a key concept in flood routing?

[A] Estimating rainfall intensity

[B] Predicting the arrival time of a flood

[C] Calculating flood frequency

[D] Determining the chemical composition of floodwater

83. A 4-hour unit (1 cm) hydrograph means

[A] 1 cm depth of rainfall over the entire watershed

[B] 1 cm depth of rainfall excess over the entire watershed where duration of rainfall is four hours

[C] a hydrograph resulting from the instantaneous application of 1 cm rainfall excess over the entire watershed

[D] that stream flow is for four hours

84. Drip irrigation minimizes water loss through

[A] evaporation and runoff

[B] percolation and runoff

[C] leaching and runoff

[D] wind and rainfall

85. A hypsometric curve is a plot of

[A] time of concentration and elevation curve of catchment

[B] area elevation curve

[C] spot rainfall values and isohyets on a basin map

[D] depth of rainfall and elevation of a catchment

86. Interception loss is

[A] more towards the end of a storm

[B] more at the beginning of a storm

[C] more in the middle of a storm

[D] uniform throughout the storm

87. Mole drain is

[A] suitable in very coarse soil

[B] a surface drainage system

[C] suitable in sandy loam soil

[D] a sub-surface drainage system

88. In sprinkler irrigation, the overlap of water spray patterns increases with

[A] decrease in water pressure

[B] increase in wind velocity

[C] increase in water pressure

[D] increase in sprinkler spacing

89. Which method of surface drainage is most suited to soils that need the combination of surface and subsurface drainages?

[A] Parallel open ditch system

[B] Random field ditch system

[C] Parallel field drain system

[D] Bedding system

90. The conjunctive use of water in a basin means

[A] combined use of water for irrigation and hydropower generation

[B] use of water by co-operative farmers

[C] use of water for irrigating both Rabi and Kharif crops

[D] combined use of surface and groundwater resources

91. Interceptor drain helps to control waterlogging by

[A] increasing water table

[B] cutoff and diverting water flow away from areas prone to waterlogging

[C] draining excess water to waterlogged area

[D] allowing vertical drainage

92. Moisture characteristic curve is a plot of

[A] moisture content versus moisture tension

[B] moisture content versus size of soil particle

[C] moisture tension versus size of soil particle

[D] moisture tension versus depth of soil in root zone

93. Which law/equation is used for determining hydraulic conductivity of the soil from a knowledge of its pore size distribution?

[A] Hooghoudt's law

[B] Bernoulli's equation

[C] Darcy's law in conjunction with Hagen-Poiseuille equation

[D] Laplace's law

94. Priming in a centrifugal pump is done to

[A] increase discharge

[B] reduce friction

[C] facilitate starting

[D] increase pressure

95. Example of reciprocating pump is

[A] centrifugal pump

[B] turbine pump

[C] hand pump

[D] jet pump

96. Water in a farm pond comes from

[A] confined aquifer

[B] tube well

[C] open well

[D] runoff

97. For a well, yield per unit of drawdown is known as

[A] specific capacity

[B] specific yield

[C] well yield

[D] safe yield

98. Multistage centrifugal pump is used for obtaining high

[A] velocity

[B] efficiency

[C] discharge

[D] head

99. The most commonly used pump for lifting water in irrigation is

[A] reciprocating pump

[B] jet pump

[C] centrifugal pump

[D] airlift pump

100. For a soil with drainable porosity of 10%, if 1 cm of water is added to groundwater, then rise in groundwater will be

[A] 1·0 cm

[B] 10·0 cm

[C] 0·1 cm

[D] No change

SPACE FOR ROUGH WORK

POVISIONAL ANSWER KEY OF

ARUNACHAL ENGINEERING SERVICE

(RECRUITMENT TEST) EXAMINATION-2025

AGRICULTURAL ENGINEERING

SET- A

Q NO.	ANS
1	A
2	C
3	D
4	A
5	B
6	B
7	D
8	A
9	A
10	D
11	A
12	C
13	C
14	A
15	B
16	A
17	C
18	A
19	B
20	D
21	C
22	C
23	C
24	D
25	B

Q NO.	ANS
26	B
27	D
28	A
29	C
30	B
31	D
32	C
33	C
34	D
35	A
36	C
37	C
38	D
39	A
40	B
41	B
42	D
43	B
44	A
45	C
46	B
47	D
48	A
49	B
50	D

Q NO.	ANS
51	B
52	A
53	A
54	C
55	D
56	A
57	B
58	D
59	C
60	D
61	B
62	B
63	A
64	A
65	A
66	A
67	B
68	C
69	B
70	D
71	D
72	B
73	C
74	B
75	C

Q NO.	ANS
76	A
77	A
78	B
79	D
80	C
81	C
82	B
83	B
84	A
85	B
86	B
87	D
88	C
89	A
90	D
91	B
92	A
93	C
94	C
95	C
96	D
97	A
98	D
99	C
100	B