



# PUNJAB TECHNICAL UNIVERSITY JALANDHAR

Max. Marks: 90

Time: 90 Mins.

## Entrance Test for Enrollment in Ph.D. Programme

### Important Instructions

- Fill all the information in various columns, in capital letters, with blue/black ball point pen.
- Use of calculators is not allowed. Use Blue/Black ball point pen for attempting the questions.
- All questions are compulsory. No negative marking for wrong answers.
- To attempt a question, make a tick mark (✓) at the right option/answer.
- Each question has only one right answer.
- Questions attempted with two or more options/answers will not be evaluated.

Stream (Engg./Arch./Pharm./Mgmt./App.Sci./Life Sci.)

Engineering.....

Discipline

Chemical Engineering.....

Name

.....

Father's Name

.....

Roll No.

Date: **15-01-2011**.....

Signature of Candidate

.....

Signature of Invigilator

.....

1. Second law of thermodynamics concern with

a	Amount of energy transferred	b	Direction of energy transferred
c	Irreversible process only	d	Non-cyclic processes only

2. Degree of freedom of the system ice-water vapor will be

a	0	b	1
c	2	d	3

3. Third law of thermodynamics is concern with

a	The value of absolute entropy	b	Energy transfer
c	Direction of energy transfer	d	None of the above

4. Mollier diagram is a plot of

a	Temperature vs enthalpy	b	Temperature vs enthalpy
c	Entropy vs enthalpy	d	Temperature vs internal energy

5. Isobaric process means a constant process

a	Temperature	b	Pressure
c	Volume	d	Entropy

6. The viscosity of a gas

a	Increases with increase in temperature	b	Decreases with increase in temperature
c	Remains unaffected with change in temperature	d	Is greater than the viscosity of a liquid

7. Centrifugal pumps

a	Deliver fluid at a uniform pressure without pulsations	b	Can be operated with a closed discharge time for a short intervals
c	Run at higher speed than positive displacement pump	d	All of the above

8. A barometer is used to measure

a	Very low pressures	b	Very high pressures
c	Pressure of fluid in a pipe line	d	Atmospheric pressure

9. The stress-strain relation of the newtoneon fluid is

a	Linear	b	Parabolic
c	Hyperbolic	d	Inverse type

10. An ideal fluid is

a	Similar to perfect gas	b	One which obeys Newton's law of viscosity
c	Frictionless and incompressible	d	Very viscous

11. Screen efficiency is

a	Recovery/rejection	b	Recovery
c	Rejection	d	None of the above

12. The crushing energy required to create new surface is given by

a	Traggart's Rule	b	Fick's Law
c	Rittinger's Law	d	None of the above

13. In a roll crusher, both the rolls

a	Have same diameter	b	Are rotated towards each other
c	Run either at same or different speeds	d	All of the above

14. Filter medium resistance is offered by the

a	Filter cloth	b	Embedded particles in the septum
c	Both (a) and (b)	d	None of the above

15. Filtrate flow rate in a constant pressure filtration

a	Continuously increases	b	Continuously decreases
c	Remains constant throughout	d	May increase or decrease; depends on the pressure

16. Steady state heat transfer occurs, when the flow of heat is

a	Uniform	b	Uniformly increasing
c	Uniformly decreasing	d	Negligible

17. Heat is transferred from an electric bulb by

a	Conduction	b	Convection
c	Radiation	d	All of the above

18. Overall coefficient of heat transfer is used in case of

a	Conduction	b	Convection
c	Radiation	d	Conduction and convection

19. Highest thermal conductivity is of

a	Air	b	Water
c	Oxygen	d	Hydrogen

20. A perfect black body

a	Is black in colour	b	Reflects all incident radiation
c	Absorbs all incident radiation	d	Transmit all incident radiation

21. Diffusion is a process of

a	Movement of particle from higher concentration to lower concentration	b	Movement of particle through a semi-permeable membrane
c	Refraction of particle	d	Accumulation of particle on a solid surface

22. The flooding in a distillation column is detected by

a	A sharp increase in pressure drop	b	A sharp increase in Murphee plate efficiency
c	A sharp decrease in pressure drop	d	A sharp decrease in liquid hold up in the column

23. Overall tray efficiency is the ratio of

a	Number of ideal trays required to the number of real trays required	b	Number of real trays required to the number of ideal trays required
c	Number of ideal trays required to the number of overall gas transfer unit	d	Number of overall gas transfer unit to the number of ideal trays required

24. Sherwood number in mass transfer corresponds to Nusselt number in heat transfer and .....number to Prandtl number.

a	Schmidt number	b	Sherwood number
c	Murphee number	d	None of the above

25. Raoult's law is applicable

a	Ideal solutions	b	Real solutions
c	The mixture of water and alcohol	d	All of the above

26. In a reaction the threshold energy is equal to

a	Activation energy	b	Activation energy + normal energy of reactants
c	Normal energy of reactants	d	Activation energy - normal energy of reactants.

27. Which of the following does not influence the rate of reaction?

a	Temperature	b	Concentration of reactants
c	Catalyst	d	Number of molecules of reactants taking part in a reaction

28. A catalyst

a	Decreases the activation energy	b	Alters the reaction mechanism
c	Increases the frequency of collisions of reacting species	d	All of the above

29. equilibrium state is

a	Dynamic	b	Static
c	Neither dynamic nor static	d	Sometimes static and sometimes dynamics

30. The rate of reaction of any component is a function of

a	Temperature of the system only	b	Pressure of the system only
c	Composition of the component only	d	Temperature pressure and composition

31. Mercury in glass thermometer is of

a	First order system	b	Second order system
c	Third order system	d	Fourth order system

32. with a damping coefficient more than 1, the second order will be

a	Under damped	b	Oscillatory
c	Over damped	d	Critically damped

33. Object of a block diagram is

a	To represent a control system conveniently	b	To visualize the relationship among the variable signals
c	Both (a) and (b) above	d	None of the above

34. Controller having maximum offset is

a	Proportional -integral controller	b	Proportional-deviation controller
c	Proportional controller	d	Proportional-integral-deviation controller

35. Routh test criterion

a	Is applicable only to those systems with polynomial characteristic equation	b	Does not prove any information about the actual location of roots
c	Both (a) and (b) above	d	None of the above

36. Power required for agitation depends upon the

a	Height and properties of the liquid	b	Agitator type and speed of agitation
c	Size of agitator and the tank	d	All of the above

37. Floating head heat exchangers are used to

a	Heat transfer between corrosive fluids	b	Cases where temperature difference between the shell and the tubes is more ( $>50^{\circ}\text{C}$ )
c	Co-current heat transfer systems	d	Counter-current heat transfer system

38. Triangular pitch tube layout as compared to square pitch in a shell and tube heat exchanger

a	Permits the use of less tubes in a given shell diameter	b	Facilitates comparatively easier external cleaning because of large clearance
c	Permits the use of more-tubes in a given shell diameter	d	None of the above

39. Diameter of the distillation column is set by

a	Number of theoretical plates	b	Allowable vapour velocity
c	Static submergence	d	Length of straight rectangular weir on cross-flow tray

40. Value of 'q' for saturated liquid feed to a distillation column is

a	0	b	<1
c	1	d	>1

41. Permanent hardness of water can be removed by

a	Simply boiling	b	Adding alum
c	Passing it through cation and anion exchanger	d	Any of the above

42. Main use of activated carbon in water treatment is to control

a	Bacterial growth	b	Taste and odour
c	Turbidity	d	None of the above

43. Production of alcohol by fermentation of molasses is an

a	Anaerobic process	b	Aerobic process
c	Endothermic process	d	None of the above

44. Hydrogenation of oils is carried out by

a	Dry process	b	Wet process
c	Either (a) or (b) above	d	Solvent extraction process

45. Black liquor contains

a	Organic sulphur compounds	b	Sodium sulphide
c	Sodium carbonate	d	All of the above

46. The 'Gobar Gas' is mainly composed by

a	CH <sub>4</sub> and CO <sub>2</sub>	b	CO and CO <sub>2</sub>
c	H <sub>2</sub> and O <sub>2</sub>	d	C <sub>2</sub> H <sub>6</sub> and O <sub>2</sub>

47. The proximate analysis of coal gives

a	C, H <sub>2</sub> and ash	b	Volatile matter, moisture, ash and fixed carbon
c	C, H <sub>2</sub> , S and N <sub>2</sub>	d	Volatile matter H <sub>2</sub> O, N <sub>2</sub> and C

48. Which of the following elements present in fuel oil is not combustible

a	Carbon	b	H <sub>2</sub>
c	Sulphur	d	O <sub>2</sub>

49. At the azeotropic composition of a binary mixture, the relative volatility is

a	0	b	∞
c	1	d	<1

50. In an ideal plate the vapour

a	And liquid leaving streams are in equilibrium	b	And liquid entering streams are in equilibrium
c	Leaving stream is in equilibrium with the liquid entering stream	d	Entering stream is in equilibrium with the liquid leaving stream

51. Which of the following is a form of research typically conducted by teachers, counselors, and other professionals to answer questions they have and to specifically help them solve local problems?

a	action research	b	basic research
c	predictive research	d	orientational research

52. How much confidence should you place in a single research study?

a	you should completely trust a single research study.	b	you should trust research findings after different researchers have found the same findings
c	neither a nor b	d	both a and b

53. Research that is done to examine the findings of someone else using the "same variables but different people" is which of the following?

a	exploration	b	hypothesis
c	replication	d	empiricism

54. A condition or characteristic that can take on different values or categories is called \_\_\_\_\_.

a	a constant	b	a variable
c	a cause-and-effect relationship	d	a descriptive relationship

55. In \_\_\_\_\_, random assignment to groups is never possible and the researcher cannot manipulate the independent variable.

a	basic research	b	quantitative research
c	experimental research	d	causal-comparative and correlational research

56. What is the defining characteristic of experimental research?

a	resistance to manipulation	b	manipulation of the independent variable
c	the use of open-ended questions	d	focuses only on local problems

57. Research in which the researcher uses both qualitative and quantitative research within a stage or across two of the stages in the research process is known as \_\_\_\_\_.

A	action research	b	basic research
C	quantitative research	d	mixed model research

58. Research that is done to understand an event from the past is known as \_\_\_\_\_?

A	experimental research	b	historical research
c	replication	d	archival research

59. \_\_\_\_\_ research occurs when the researcher manipulates the independent variable.

a	causal-comparative	b	experimental
c	ethnography	d	correlation

60. Which of the following includes examples of quantitative variables?

a	age, temperature, income, height	b	grade point average, anxiety level, reading performance
c	gender, religion, ethnic group	d	both a and b

61. In research, something that does not "vary" is called a \_\_\_\_\_.

a	variable	b	method
c	constant	d	control group

62. The statement of purpose in a research study should:

a	Identify the design of the study	b	Identify the intent or objective of the study
c	Specify the type of people to be used in the study	d	Describe the study

63. According to the text, which of the following orders is the recommended in the flowchart of the development of a research idea?

a	Research topic, research problem, research purpose, research question, hypothesis	b	Research topic, research purpose, research problem, research question, hypothesis
c	Research topic, research problem, research purpose, research question, hypothesis	d	Research topic, hypothesis, research problem, research question, research purpose

64. When referencing other works you have cited within the text of the report you should

a	State the first and last name of the author	b	Use the author, date citation method
c	Use an asterisk and a footnote	d	Insert the complete citation in parenthesis

65. The feasibility of a research study should be considered in light of:

a	Cost and time required to conduct the study	b	Skills required of the researcher
c	Potential ethical concerns	d	All of the above

66. The act of publishing the same data and results in more than one journal or publication refers to which of the following professional issues:

a	Partial publication	b	Duplicate publication
c	Deception	d	Full publication

67. Which of these is not a method of data collection.

a	Questionnaires	b	Interviews
c	Experiments	d	Observations

68. Which of the following terms best describes data that were originally collected at an earlier time by a different person for a different purpose?

a	Primary data	b	Secondary data
c	Experimental data	d	Field notes

69. When a researcher starts with the dependent variable and moves backwards, it is called \_\_\_\_\_.

a	Predictive research	b	Retrospective research
c	Exploratory research	d	Descriptive research

70. Which of the following is characteristic of qualitative research?

a	Generalization to the population	b	Random sampling
c	Unique case orientation	d	Standardized tests and measures

71. The presence of impurities in iron

a	Lowers the melting point	b	Raises the melting point
c	Has no effect on melting point	d	Makes iron malleable

72. Which one of the following statements is wrong?

a	Alloys containing copper may be white	b	A soft metal may be hardened by alloying it with another metal or non-metal.
c	Silver-plated copper articles contain an alloy of copper and silver	d	Alloys containing carbon are grey or black

73. Brass is composed of

a	Cu-----Zn	b	Cu----Sn
c	Sn-----Zn	d	Al----B

74. Plastic deformation is

a	The temporary distortion of a material under the action of applied stress	b	The permanent distortion of a material under the action of applied stress
c	Related to plastics	d	None of the above

75. Corrosion is prevented or its rate is reduced by

a	Increasing the resistance between anodic and cathodic area	b	Decreasing anodic or cathodic polarization by increasing the diffusion of reactants and products
c	Decreasing the resistance between anodic and cathodic areas	d	None of the above

76. Oleum is

a	A mixture of conc. H <sub>2</sub> SO <sub>4</sub> and oil	b	Sulphuric acid which gives fumes of sulphur dioxide
c	Sulphuric acid saturated with sulphur trioxide	d	A mixture of sulphuric and nitric acids

77. Producer gas is obtained by

a	Thermal cracking of naphtha	b	Passing steam and air through red hot coke
c	Passing air through red hot coke	d	Passing steam through red hot coke

78. The constituents of water gas are

a	CO and H <sub>2</sub> O	b	CO <sub>2</sub> and N <sub>2</sub>
c	CO and H <sub>2</sub>	d	CO and N <sub>2</sub>

79. The setting of plaster of Paris takes place with

a	Loss of CO <sub>2</sub>	b	Hydrolysis
c	Hydration	d	Dehydration

80. Glass is

a	A crystalline solid	b	A super cooled liquid
c	A solid having a definite melting point	d	A compound of Ca, Na, Si and O

81. Crude petroleum consists of

a	84-87 per cent carbon and 11-14 per cent hydrogen	b	11-14 per cent carbon and 84-87 per cent hydrogen
c	54 per cent carbon and 25 per cent hydrogen	d	70-72 per cent carbon and 5-7 per cent hydrogen

82. Which of the following petroleum products has minimum °API?

a	Gasoline	b	Furnace oil
c	Light diesel oil	d	High speed diesel oil

83. For petroleum products, °API is given by

a	°API = 131.5/S - 141.5	b	°API = 141.5/S - 131.5
c	°API = 145/S - 130	d	°API = 141.5 - 131.5/S

84. LPG

a	is a mixture of a saturated and unsaturated hydrocarbons in the C <sub>3</sub> and C <sub>4</sub> range	b	is a mixture of methane and carbon dioxide
c	is a mixture of methane and hydrogen	d	is a mixture of saturated and unsaturated hydrocarbons in the C <sub>6</sub> and C <sub>7</sub> range

85. Which of the following compounds is added in LPG to impart a distinct odour?

a	Amyl nitrate	b	Ethyl mercaptan
c	Tetra ethyl lead	d	Phenol

86. Combustion reaction is

a	An endothermic reaction	b	An exothermic reaction
c	An autocatalytic reaction	d	A photochemical reaction

87. The combustion process is usually accompanied by

a	rise in temperature and fall in pressure	b	rise in temperature and pressure
c	fall in temperature and pressure	d	fall in temperature and rise in pressure

88. A fuel can be defined as any combustible matter that is used to produce heat. So the fuels may be

a	Solids	b	Gases
c	Liquids	d	All of the above

89. Theoretical flame temperature is the temperature attained

a	When a fuel is burned in air	b	When a fuel is burned in oxygen
c	When a fuel is burned in air or oxygen	d	When a fuel is burned in air or oxygen without gain or loss of heat.

90. The quality of best fuel is

a	Its low cost	b	The negligible ash
c	Its high calorific value	d	Its easy availability