

**DEPARTMENTAL PROMOTION EXAMINATION
FOR SPS-7A/7B**



**SAMPLE PAPERS
DPE-2017**

PAKISTAN ATOMIC ENERGY COMMISSION

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1.0 GUIDELINES

1. Each candidate is required to attempt one written examination.
2. The examination paper comprises of two sections namely A and B.
3. There will be 25 MCQs in Section-A and it will be same for all candidates.
4. Section A, which will be same for all candidates, will assess the general knowledge.
5. Section B will assess the breadth of knowledge in the candidates' field. It will be composed of 50 MCQs and 25 True/False.
6. Minimum passing marks will be an aggregate of 60%.
7. The duration of test will be three hours.
8. Each correct answer of MCQ will have +1 point, while each incorrect answer will have minus 0.25 point.
9. Each correct answer of true / false will have +1 point, while each incorrect answer will have -0.5 point.
10. Calculator may be used.
11. The mobile phone is strictly prohibited in the examination room.
12. Detailed syllabi are provided in this book.
13. At the end of syllabus suggested books are given, it will help in the preparation. However, it is not necessary that the paper will be from the suggested books.
14. At the end of suggested books, sample questions are given to give an idea to the candidate of the nature and level of the actual examination.

2.0 SAMPLE PAPERS

Sample questions for each technology are as follows:

2.1 DPE – A00: General Knowledge

1. The angel who will blow the trumpet on the day of Judgment is:
 - A. Hazrat Mekail
 - B. Hazrat Gibrail
 - C. Hazrat Israfil
 - D. None of these
2. The first Governor General of Pakistan was:
 - A. Khawaja Nazim-ud-din
 - B. Malik Ghulam Muhammad
 - C. Quaid-e-Azam Muhammad Ali Jinnah
 - D. Liaquat Ali Khan
3. The Devastating earthquake in Pakistan occurred on:
 - A. 10th Oct. 2005
 - B. 8th Oct. 2005
 - C. 3rd Oct 2005
 - D. 6th Oct, 2006
4. PINSTECH is an abbreviation for:
 - A. Pakistan Institute of Technology & Chemistry.
 - B. Pakistan Institute of Technical Education.
 - C. Pakistan Institute of Nuclear Science & Technology.
 - D. Pakistan Institute of Science & Technology.
5. In PAEC, a Senior Scientist is in SPS:
 - A. 7
 - B. 8
 - C. 9
 - D. None of these
6. The type of work being done in NIBGE is:
 - A. Nuclear fuel cycle related
 - B. Nuclear reactor design
 - C. Biology and genetic engineering
 - D. Computer software and hardware development
7. One of the countries through which equator passes _____.
 - A. Kenya
 - B. Australia
 - C. Pakistan
 - D. Russia
8. In the absence of the president, who acts as the President of Pakistan?
 - A. Chairman Senate
 - B. Chief Justice of Supreme Court
 - C. Speaker of National Assembly
 - D. Prime Minister of Pakistan
9. To which Prophet the Holy Book 'Zabur' was revealed?
 - A. Ibrahim (AS)
 - B. Dawood (AS)
 - C. Moosa (AS)
 - D. Essa (AS)
10. _____ is the first bank of Pakistan.
 - A. National Bank
 - B. Habib Bank
 - C. Muslim Commercial Bank
 - D. State Bank

11. Cave Hira is in the _____ mountain.
 - A. Al Safah
 - B. Al Marwah
 - C. Uhad
 - D. Jabal al Noor
12. The national animal of Pakistan is _____.
 - A. Chakor
 - B. Dove
 - C. Markhor
 - D. Honey bee
13. Hajj is not complete unless one goes to _____.
 - A. Madina
 - B. Mina
 - C. Arafat
 - D. None of the above
14. Which one is the largest desert in Pakistan?
 - A. Thar
 - B. Cholistan
 - C. Rohi
 - D. Gobi
15. Mirani Dam is located in _____.
 - A. Sindh
 - B. Punjab
 - C. KPK
 - D. Baluchistan
16. CNG stands for _____.
 - A. Converted natural gas
 - B. Conducted natural gas
 - C. Compressed natural gas
 - D. Condensed natural gas
17. By population, Pakistan is world's _____ largest country.
 - A. 3rd
 - B. 6th
 - C. 10th
 - D. None of the above
18. Sindh Madrassah-tul-Islam, Karachi was founded by _____.
 - A. Aga Hassan Ali Afandi
 - B. Sir Aga Khan
 - C. Khalifa Hameed ud din
 - D. Sir Syed Ahmed Khan
19. Fifth Kalma is 'Istigfaar'. Name the sixth Kalma?
 - A. Tayyabah
 - B. Tauheed
 - C. Tamjeed
 - D. Radd-e-Kufr
20. Manchar lake situated in
 - A. Sawat
 - B. Dadu
 - C. Muree
 - D. Gilgit

2.2 DPE – A11: Chemical Technology

1. A fluid means:
 - A. Liquid only
 - B. Gas only
 - C. Solid only
 - D. Both a and b
2. “ μ ” stands for the fluid:
 - A. Density
 - B. Velocity
 - C. Viscosity
 - D. None of above
3. pH of water is:
 - A. 7.9
 - B. 13
 - C. 4.9
 - D. 7
4. Which pH corresponds to acid:
 - A. 14
 - B. 9
 - C. 7
 - D. 3
5. Oxidation occurs at:
 - A. Cathode
 - B. Anode
 - C. Both a and b
 - D. None at a and b
6. Temperature at which a solid change into a liquid is called:
 - A. Boiling point
 - B. Melting point
 - C. Freezing point
 - D. none of above
7. Hydrocarbons are compounds formed form:
 - A. H & O
 - B. C & O
 - C. C & H
 - D. C & Ag
8. MOLARITY is:
 - A. It is the no of moles of the solute dissolved per liter of the solution
 - B. It is the no of atoms of the solute dissolved per liter of the water
 - C. It is the no of moles of the water dissolved per liter of the solution
 - D. None of above
9. What is the correct formula of heavy water?
 - A. H_2O_2
 - B. H_2O
 - C. D_2O
 - D. D_3O
10. What happens in the nuclear reactor?
 - A. Fusion
 - B. Fission
 - C. Chemical reaction
 - D. none of above

11. Which of the following is/are example(s) of rotary positive displacement pump(s)?
 - A. diaphragm pump
 - B. vane pump
 - C. plunger pump
 - D. All of the above
12. Horsepower requirement for given pump capacity depends upon the:
 - A. specific gravity of the liquid
 - B. suction lift
 - C. discharge head
 - D. All of the above
13. The monomer of PVC is:
 - A. Succinic
 - B. Vinyl chloride
 - C. Propylene
 - D. Glycol
14. Turbulent flow exists, when Reynolds No. exceed?
 - A. 2100
 - B. 2200
 - C. 2000
 - D. 1900
15. Law of conservation of matter states that:
 - A. Total mass of all materials entering a system in a given time must equal the total mass of materials leaving plus any accumulation in the system
 - B. Total mass of all materials entering a system in a given time must equal the total mass of materials leaving from the system
 - C. Total mass of all materials entering a system in a given time must not equal the total mass of materials leaving plus any accumulation in the system
 - D. None of A, B & C
16. What happened in endothermic Reaction?
 - A. Heat is evolved
 - B. Heat is absorbed
 - C. No heat is evolved
 - D. No heat is absorbed
17. What is ion exchange process?
 - A. Ion Exchange system separate ionic contaminants from solution through a specialized resin where undesirable ions are replaced by other ions of the same electrical charge.
 - B. Ion Exchange system mixes ionic contaminants from solution through a specialized resin where undesirable ions are replaced by other ions of the same electrical charge.
 - C. Ion Exchange system dissolves ionic contaminants from solution through a specialized resin where undesirable ions are replaced by other ions of the same electrical charge.
 - D. Ion Exchange systems leach ionic contaminants from solution through a specialized resin where undesirable ions are replaced by other ions of the same electrical charge.
18. Rotary drum vacuum filter consists of a drum rotating in a tub of liquid to be filtered. The technique is well suited for which of the following types of materials?
 - A. Slurries and liquids with a high solid content
 - B. Gases with a high solid content
 - C. Slurries only
 - D. Gases and liquids with a high solid content

19. Drying is a mass transfer process consisting of the removal of water or another solvent by evaporation from which of the following type of materials?
 - A. Solid & semi-solid materials
 - B. Gaseous materials only
 - C. Amorphous materials
 - D. Liquid materials only
20. Size reduction is a process of reducing large solid unit masses into small unit masses, coarse particles or fine particles. This process is also termed as?
 - A. Diminution
 - B. Pulverizations
 - C. Both A & B
 - D. None of A & B

2.3 DPE – A12: Civil Technology

1. Stone masonry made from uniformly sized coursed stones interlocked with mortar is called:
 - A. Rubble masonry
 - B. Ashlar masonry
 - C. Random rubble masonry
 - D. none of above
2. A brick placed with its length parallel to the face of the wall is called:
 - A. Stretcher
 - B. Header
 - C. Closer
 - D. None of the above.
3. When loads are applied proportionately to a frame structure containing members in one plane, the structure is called?
 - A. Grid frame.
 - B. Plane frame.
 - C. Space frame.
 - D. Truss frame.
4. In a cantilever beam loaded with a point load 'P' at its free end, the maximum reaction at support shall be:
 - A. $P/2$
 - B. $2P$
 - C. P
 - D. $P/4$
5. PVC stands for:
 - A. Plastic vinyl chloride
 - B. Poly vinyl chloride
 - C. Polythene vinyl carbon
 - D. Polythene vanadium chloride
6. The surface where two successive placements of concrete meet, is known as:
 - A. Construction joint
 - B. Expansion joint
 - C. Contraction joint
 - D. Both (a) and (b)
7. A relatively fixed point of known elevation is called:
 - A. Bench mark
 - B. Datum point
 - C. Reduced level
 - D. Reference point

8. The gradient of sewers depends upon:
- A. Minimum and maximum velocity of flow
 - B. Diameter of the sewer
 - C. The discharge
 - D. All the above
9. Open channels supported above ground are generally known as:
- A. Raised canals
 - B. Aqueduct
 - C. Siphon
 - D. None of the above
10. The water content in a soil sample when it continues to lose weight without losing the volume, is called:
- A. Shrinkage limit
 - B. Plastic limit
 - C. Liquid limit
 - D. Semi-solid limit
11. The basic purpose of a retarder in concrete is:
- A. To increase the initial setting time of cement paste in concrete
 - B. To decrease the initial setting time of cement paste in concrete
 - C. To render the concrete more water tight
 - D. To improve the workability of concrete mix
12. The failure of foundation of a building is due to:
- A. withdrawal of subsoil moisture
 - B. unequal settlement of soil
 - C. lateral escape of the supporting material
 - D. All of the above
13. The property of fresh concrete, in which the water in the mix tends to rise to the surface while placing and compacting, is called:
- A. Segregation
 - B. bleeding
 - C. bulking
 - D. creep
14. A 28 days curing of concrete attains the strength:
- A. 20 to 40 %
 - B. 40 to 60%
 - C. 61 to 80%
 - D. 90 to 95 %
15. The ratio of the volume of voids to the total volume of soil mass is called:
- A. Water content ratio
 - B. Porosity
 - C. Void ratio
 - D. Degree of saturation
16. Number of bricks required for one cubic meter of brick masonry:
- A. 300
 - B. 500
 - C. 700
 - D. 1000
17. A bridge supported on cables is called:
- A. deck
 - B. suspension
 - C. arched
 - D. through

18. A baseline in a chain survey:
- A. Checks the accuracy
 - B. Ending line
 - C. fixed up the directions of all other lines
 - D. All of the above
19. Unit of plaster work is:
- A. sft
 - B. cft
 - C. rft
 - D. psi
20. The bottom horizontal member of the frame of door is called:
- A. Head
 - B. Post
 - C. Style
 - D. Sill

2.4 DPE – A13: Computer Technology

1. The memory, which is generally programmed by the computer manufacturer, is:
- A. ROM
 - B. DIMM
 - C. SIMM
 - D. RAM
2. The default increment for a For-Next loop is:
- A. -1
 - B. 1
 - C. 0
 - D. 2
3. ISP stands for:
- A. Internet side programming
 - B. Internet Side project
 - C. Internet service provider
 - D. International server programmer
4. In the content of memory units, 1 kilo =?
- A. 1000
 - B. 1024
 - C. 512
 - D. 2048
5. FORTRAN language was used for:
- A. Business calculations
 - B. Scientific Computations
 - C. Data Processing
 - D. Communication
6. The bus is a group of :
- A. Wires
 - B. data bits
 - C. Vehicles
 - D. Signals
7. Simplifying $AB + AB$ results in:
- A. A
 - B. AB
 - C. A + B
 - D. A-B

8. The DOS command dir is used to:
 - A. Find direction of a file
 - B. Find files which have dir in their name
 - C. List current directory files and subdirectories
 - D. None of the above
9. Bandwidth refers to
 - A. the cost of the cable required to implement a WAN
 - B. the cost of the cable required to implement a LAN
 - C. the amount of information a peer-to-peer network can store
 - D. the amount of information a communications medium can transfer in a given amount of time
10. Which is the name of the network topology in which there are bidirectional links between each possible node?
 - A. Ring
 - B. Star
 - C. Tree
 - D. Mesh
11. The first network that has planted the seeds of Internet was
 - A. ARPANET
 - B. NSF net
 - C. V net
 - D. I net
12. Typical data transfer rate in LAN are of the order of
 - A. bits per second
 - B. kilo bits per second
 - C. mega bits per second
 - D. tera bits per seconds
13. _____ is commonly used data format for exchanging information between computers or programs
 - A. ASCII
 - B. HTML
 - C. XML
 - D. DHTML
14. The IEEE standard of LAN is
 - A. IEEE 802.1
 - B. IEEE 802.12
 - C. IEEE 802
 - D. IEEE 802.9
15. A _____ is a group of independent computers attached to one another through communication media.
 - A. Internet
 - B. E-mail
 - C. Network
 - D. All the above
16. What happens when you press Ctrl + X key?
 - A. A Capital X letter is typed into your document at the cursor point
 - B. Selected object is cut and copied to the Clipboard
 - C. Typing mistake is auto-corrected
 - D. Document is closed
17. By default, a Word document prints in _____ mode.
 - A. Landscape
 - B. Portrait
 - C. Page Setup
 - D. Print Preview

18. The blinking symbol on the computer screen is called the
 - A. mouse
 - B. logo
 - C. hand
 - D. cursor
19. Various applications and documents are represented on the Windows desktop by ____
 - A. Symbols
 - B. Labels
 - C. Menu bars
 - D. Icons
20. Which of the following is true when data is entered into a memory location?
 - A. It will add to the content of the location
 - B. It will change the address of the memory location
 - C. It will erase the previous content
 - D. It will not be fruitful if there is already some data at the location

2.5 DPE – A14: Electrical Technology

1. The voltages induced in the three windings of a 3-phase alternator are _____ degree apart in time phase:
 - A. 120
 - B. 60
 - C. 90
 - D. 30
2. A transformer transforms:
 - A. Frequency
 - B. Voltage
 - C. Power
 - D. Magnetic flux
3. Which of the following bulbs will have the least resistance:
 - A. 220 V, 60 W
 - B. 220 V, 100W
 - C. 115 V, 60W
 - D. 115 V, 100W
4. The function of breather in a transformer is:
 - A. To provide oxygen to the cooling oil
 - B. To provide cooling air
 - C. To arrest flow of moisture when outside air enters the transformer
 - D. To cool transformer oil
5. A transformer having 1000 primary turns is connected to a 250 V a.c. supply, for secondary voltage of 400 V the number of secondary turns should be:
 - A. 1600
 - B. 250
 - C. 400
 - D. 16
6. Metallic shielding is provided on cables to:
 - A. Control the electrostatic voltage stress
 - B. Reduce corona effect
 - C. Decrease thermal resistance
 - D. All of the above
7. The breakdown voltage of a cable depends upon:
 - A. Time of application of voltage
 - B. Presence of moisture
 - C. All of the above
 - D. None of the above

8. As the load is increased, the speed of a dc shunt motor:
 - A. Increases proportionally
 - B. remains constant
 - C. Increases slightly
 - D. Reduces slightly
9. Which of the following wires has the greatest cross-sectional area?
 - A. 9 AWG
 - B. 14 AWG
 - C. 22 AWG
 - D. 30 AWG
10. Which of the following circuit configurations has the same amount of voltage drop across each of its components?
 - A. parallel
 - B. series-parallel
 - C. series
 - D. combination
11. Which of the following devices can be used to test the windings of an inductor for continuity?
 - A. Wattmeter
 - B. Voltmeter
 - C. Ohmmeter
 - D. Wheatstone bridge
12. What should be observed when connecting a voltmeter into a DC circuit?
 - A. rms
 - B. resistance
 - C. polarity
 - D. power factor
13. The main purpose of the transformer core in a transformer is to:
 - A. decrease iron losses
 - B. prevent eddy current
 - C. eliminate magnetic hysteresis
 - D. decrease reluctance of magnetic circuit
14. The typical distribution system for houses is:
 - A. Single phase, two wire
 - B. Two phase, two wire
 - C. Single phase, three wire
 - D. None of the above
15. The size of the feeder is determined primarily by:
 - A. The current it is required to carry
 - B. The percentage variation of voltage in the feeder
 - C. The voltage across the feeder
 - D. The distance over which the transmission is to be made
16. The inductance of a coil can be increased by:
 - A. Decreasing the number of turns
 - B. Increasing the core length
 - C. Using a core material of high relative permeability
 - D. All of the above
17. The power factor at resonance in an RLC parallel circuit is:
 - A. 0.5 lagging
 - B. 0.5 leading
 - C. Unity
 - D. Zero

18. A floating battery is the one:
 - A. which is getting charged
 - B. which is feeding load
 - C. in which battery, voltage is equal to charger voltage
 - D. which gets charged and discharged simultaneously
19. The sparking at the brushes in a D.C generator is attributed to:
 - A. Quick reversal of current in the coil under commutation
 - B. Armature reaction
 - C. Reactance voltage
 - D. High resistance of the brushes
20. Which of the following circuit conditions does a metal oxide varistor (MOV) protect against?
 - A. high voltage
 - B. high current
 - C. high circuit noise
 - D. high cross-talk

2.6 DPE – A15: Electronics Technology

1. Every known element has:
 - A. The same type of atoms
 - B. The same number of atoms
 - C. A unique type of atom
 - D. Several different types of atoms
2. The atomic number of germanium is:
 - A. 8
 - B. 2
 - C. 4
 - D. 32
3. What is the basic unit for measuring current flow?
 - A. Volt
 - B. Atomic weight
 - C. Ampere
 - D. Coulomb
4. In a semiconductor crystal, the atoms are held together by:
 - A. The interaction of valence electrons
 - B. Forces of attraction
 - C. Covalent bonds
 - D. all of the above
5. Which semiconductor material is made from coal ash?
 - A. germanium
 - B. silicon
 - C. tin
 - D. Carbon
6. Which material may also be considered a semiconductor element?
 - A. carbon
 - B. ceramic
 - C. mica
 - D. argon
7. The band gap for germanium (Ge) is:
 - A. 0.67 eV
 - B. 3.4 eV
 - C. 7.26 eV
 - D. 5.5 eV

8. A pn junction acts as a _____.
 - A. Controlled switch
 - B. Open switch
 - C. Bidirectional switch
 - D. Unidirectional switch
9. During normal working of a transistor as an amplifier, the collector to base junction is _____.
 - A. Un biased
 - B. Forward biased
 - C. Reverse biased
 - D. None of the above
10. In a steady state dc series circuit, capacitor & inductor act (respectively) like:
 - A. Short & open
 - B. Open & open
 - C. Short & short
 - D. Open & short
11. What is the value of ceramic disk capacitor topographically labeled as 0.02MF?
 - A. $0.02\mu\text{F}$
 - B. $200\mu\text{F}$
 - C. 0.02pF
 - D. 200pF
12. The output frequency of a half wave rectifier is:
 - A. equal to the input frequency
 - B. smaller than the input frequency
 - C. greater than the input frequency
 - D. unknown
13. If the solder done on a PCB appears dull, it indicates:
 - A. a cold solder connection
 - B. an overheated solder connection
 - C. a good solder connection
 - D. a broken solder connection
14. Which material may also be considered a semiconductor element?
 - A. carbon
 - B. ceramic
 - C. mica
 - D. argon
15. The band gap for germanium (Ge) is:
 - A. 0.67 eV
 - B. 3.4 eV
 - C. 7.26 eV
 - D. 5.5 eV
16. A pn junction acts as a
 - A. Controlled switch
 - B. Open switch
 - C. Bidirectional switch
 - D. Unidirectional switch
17. Due to Forward Bias, the depletion region is:
 - A. Narrowed
 - B. Broadened
 - C. Eliminated
 - D. unchanged
18. The knee voltage of a crystal diode is approximately equal to
 - A. Applied voltage
 - B. Breakdown voltage
 - C. Forward voltage
 - D. Barrier potential

19. A zener diode has
 - A. One pn junction
 - B. Two pn junctions
 - C. Two p and one n junctions
 - D. Two n and one p junctions
20. The element that has the biggest size in a transistor is
 - A. collector
 - B. base
 - C. emitter
 - D. collector-base-junction

2.7 DPE – A16: Instrumentation Technology

1. Under the identical values of cold and hot junction temperatures, which thermocouple gives highest output?
 - A. iron-constantan
 - B. nickel-nimo
 - C. chrome-constantan
 - D. platinum-platinum-rhodium
2. An accurate ammeter must have a resistance of ____ value:
 - A. Very high
 - B. high
 - C. Low
 - D. very low
3. The resistance of a thermistor changes with temperature as:
 - A. resistance increases with increasing temperature
 - B. resistance decreases with increasing temperature
 - C. resistance decreases with decreasing temperature
 - D. resistance does not change with temperature
4. If a square wave is integrated by integrator using an operational amplifier, the output is:
 - A. Triangular wave
 - B. ramp
 - C. sine wave
 - D. same, i.e. a square wave
5. Decibel is a unit of:
 - A. Frequency
 - B. impedance
 - C. Power
 - D. ratio of power
6. Thermocouple transducers are voltage-generating devices. However, if an external voltage is applied to the device it will work as:
 - A. RTD
 - B. thermister
 - C. Refrigerator
 - D. Both A and B
7. The digits in a measured number that are known to be corrected are called:
 - A. Accuracy digits
 - B. significant digits
 - C. Error digits
 - D. precision digits

8. A measure of the repeatability of a measurement of some quantity is:
- A. error
 - B. precision
 - C. accuracy
 - D. significant
9. The decimal number 18 is equal to the binary number _____:
- A. 11110
 - B. 10001
 - C. 10010
 - D. 1111000
10. The phenomenon in which substance generates voltage when it is subjected to dynamic forces or stress is known as:
- A. Piezoelectric
 - B. Thermoelectric
 - C. Photoelectric
 - D. Radioactive
11. To compensate for temperature changes:
- A. Strain gauge is reversed
 - B. Dummy strain gauge is used
 - C. Strain gauge is applied on insulation
 - D. Strain gauge of smaller value is used
12. A fuse is normally a:
- A. Voltage limiting device
 - B. Current limiting device
 - C. Power limiting device
 - D. Power factor correcting device
13. A thermocouple is based on the principle of:
- A. Seebeck effect
 - B. resistance changing effect
 - C. Piezoelectric effect
 - D. Photoconductive effect
14. The instrument you would use to track down sources of noise or filter problems is the:
- A. ammeter
 - B. logic probe
 - C. megohmmeter
 - D. oscilloscope
15. Combination of DCS and PLC is a:
- A. PLC based DCS system
 - B. Hybrid system
 - C. PC based DCS system
 - D. None of the above
16. HART Communication standard is a(an):
- A. Digital standard
 - B. Analog standard
 - C. Hybrid standard
 - D. None of the above
17. Primary element used for measuring pressure is:
- A. Diaphragm
 - B. Pressure Transmitter
 - C. Diaphragm and Pressure Transmitter
 - D. None of the above

18. Pt100 means:
 - A. 100 OHM at 10°C
 - B. 100 OHM at 0°C
 - C. 100 OHM at 25°C
 - D. None of the above
19. Dead weight tester is a:
 - A. Flow Calibrator
 - B. Temperature Calibrator
 - C. Pressure Calibrator
 - D. None of the above
20. The standard electronic instrument signal is:
 - A. 4 – 20mA DC
 - B. 0 – 24mA
 - C. -12 - +12mA
 - D. None of the above

2.8 DPE – A17: Mechanical Technology

1. For pumping highly viscous fluid, the type of pump generally used is:
 - A. Centrifugal
 - B. Multistage centrifugal
 - C. Screw pump
 - D. Gear pump
2. Which of the following is more accurate?
 - A. Micrometer
 - B. Vernier caliper
 - C. Steel rule
 - D. Meter tape
3. A gas which obeys kinetic theory perfectly is known as:
 - A. Monoatomic gas
 - B. Diatomic gas
 - C. Real gas
 - D. Perfect gas
4. The molecules move in a solid:
 - A. At random
 - B. In circular motion
 - C. Back and forth like tiny pendulum
 - D. In irregular motion
5. Centrifugal blowers can supply:
 - A. Large volumes of air at low pressure
 - B. Large volumes of air at high pressure
 - C. Small volumes of air at high pressure
 - D. Small volumes of air at low pressure
6. During regenerative feed heating:
 - A. Part of the steam is generated in turbine
 - B. Condenser is supplied with dry and saturated steam
 - C. Part of the steam is bled from turbine for feed heating
 - D. High pressure steam is used to heat low pressure steam coming out of the turbine after expansion
7. Rivets are made of:
 - A. Brittle material
 - B. Ductile material
 - C. Soft material
 - D. Hard material

8. The amount of energy required up to fracture is known as:
 - A. Damping effect
 - B. Toughness
 - C. Creep strength
 - D. Fatigue strength
9. Which tool is used to remove a small amount of metal?
 - A. Hack saw
 - B. Screwdriver
 - C. Hole punch
 - D. File
10. Falling drops of water become spheres due to the property of:
 - A. Surface tension of water
 - B. compressibility of water
 - C. Capillarity of water
 - D. viscosity of water
11. What percentage of an iceberg's volume, floating in seawater, is submerged when the densities are 920 and 1030 kg/m³ for ice and seawater respectively?
 - A. 79.32%
 - B. 89.32 %
 - C. 99.32%
 - D. None of the above
12. When a body, floating in a liquid, is given a small angular displacement, it starts Oscillating about a point known as
 - A. Centre of pressure
 - B. Centre of gravity
 - C. Centre of buoyancy
 - D. metacentre
13. A flow in which each liquid particle does not have a definite path and the paths of individual particles also cross each other, is called:
 - A. non-streamline flow
 - B. turbulent flow
 - C. non-uniform flow
 - D. unsteady flow
14. The mass flow rate in the pipe must be constant at all sections, provided the conditions about leaks, additions and storage are satisfied. This is called:
 - A. Bernoulli's Principle
 - B. Continuity Principle
 - C. Archimedes's principle
 - D. None of the above
15. If the source of supply is located below the pump, then the measured vertical distance (expressed in meters) from the centre line of the pump to the free level of the liquid to be pumped is called:
 - A. Static Suction Lift
 - B. Static Suction Head
 - C. Total Static Head
 - D. Discharge Head
16. The Bernoulli's equation is based on:
 - A. Law of Conservation of Energy
 - B. Law of Conservation of Mass
 - C. Law of Conservation of Momentum
 - D. None of the above

17. An air vessel is provided at the summit in a syphon to:
 - A. Avoid interruption in the flow
 - B. increase discharge
 - C. Increase velocity
 - D. maintain pressure difference
18. When a gas is expanded through an aperture of minute dimensions, the process is known as:
 - A. Isothermal process
 - B. adiabatic process
 - C. Free expansion process
 - D. throttling process
19. Strain rosetters are used to:
 - A. Measure shear strain
 - B. measure linear strain
 - C. Measure volumetric strain
 - D. relieve strain
20. Falling drops of water become spheres due to the property of:
 - A. surface tension
 - B. compressibility
 - C. capillarity
 - D. viscosity

2.9 DPE – A18: Metallurgy Technology

1. Which one is not used as binder in sand molding?
 - A. Cement
 - B. Molasses
 - C. resin
 - D. Coal dust
2. Cupola furnace is used for melting of _____.
 - A. Steels
 - B. Al-alloys
 - C. Cast irons
 - D. Cu-alloys
3. In Aluminum foundry practice, “drossing” is _____:
 - A. The blowing of a gas through the melt
 - B. The formation and floating of metal oxide on melt surface
 - C. The pouring of melt in the mold
 - D. A pattern making method
4. Which one is not a non destructive technique?
 - A. Radiography
 - B. Impact testing
 - C. Ultrasonic testing
 - D. Eddy current testing
5. Stress-strain diagram of a material does not tell about _____:
 - A. Hardness
 - B. Elastic modulus
 - C. Yield strength
 - D. Toughness
6. Material selected for spring making must have:
 - A. High yield strength
 - B. High modulus of elasticity
 - C. High toughness
 - D. High compressive strength

7. Austenitizing is:
 - A. Heating of steel above the recrystallization temperature.
 - B. Cooling of steel from some high temperature to room temperature.
 - C. Cooling of steel to subzero temperature
 - D. Heating of steel above melting temperature
8. Purpose of tempering is:
 - A. To increase in toughness
 - B. To increase in hardness
 - C. To increase in elasticity
 - D. All of the above
9. Crystal structure of U at room temperature is _____:
 - A. BCC
 - B. FCC
 - C. Octagonal
 - D. Orthorhombic
10. 5XXX series Aluminum alloys contain _____ as major alloying addition:
 - A. Mg
 - B. Mn
 - C. Si
 - D. Cu
11. The most suitable casting process for producing very large parts is:
 - A. Investment casting
 - B. Die casting
 - C. Centrifugal casting
 - D. Sand casting
12. Brinell hardness test is more suitable for _____.
 - A. Stainless steels
 - B. Gray cast iron
 - C. Ti-alloys
 - D. Brass
13. Difference between Stainless Steel "304L" and Stainless Steel "316L" is:
 - A. Former is ferritic while later is austenitic
 - B. Former has more carbon than later one
 - C. Former doesn't contain Mo while later does
 - D. All of the above
14. MAG stands for:
 - A. Metal Argon Gas
 - B. Metal Automatic Gas
 - C. Metal Active Gas
 - D. Metal Acetylene Gas
15. Which one of the following metals has the lowest density?
 - A. Aluminum
 - B. Copper
 - C. Magnesium
 - D. Tin
16. For normalizing process the cooling medium is:
 - A. hot water
 - B. oil
 - C. oil+ water mixture
 - D. air

17. Cu and W can be alloyed by:
 - A. Melting
 - B. Welding
 - C. Powder metallurgy
 - D. Can't be alloyed
18. Advantage of powder rolling is
 - A. Elimination of initial hot ingot break down
 - B. Fine grain size of the product
 - C. Minimum preferred orientation
 - D. All of the above
19. A material has better mechanical properties if it has
 - A. Elongated grains
 - B. Coarse equiaxed grains
 - C. Coarse grains with twinned structure
 - D. Fine equiaxed grains
20. The minimum cross sectional dimensions of a steel billet are:
 - A. 20×20mm
 - B. 30×30mm
 - C. 40×40mm
 - D. 50×50mm

2.10 DPE – A19: Mining

1. Maximum coal production in the world is by:
 - A. Open Pit Mining
 - B. Open Cast Mining
 - C. Room & Pillar Mining
 - D. Long Wall Mining
2. Methane gas accumulates in the:
 - A. Floor of the mine
 - B. Middle of the mine
 - C. Roof of the mine
 - D. Nowhere
3. The most stable shape of an opening in homogenous rock is:
 - A. Horse shoe
 - B. Semi circular
 - C. Trapezoidal
 - D. Circular
4. 1 hp. is equal to:
 - A. 546 watts
 - B. 0.746 kilo watts
 - C. 1046 watts
 - D. none of above
5. In a mine opening tensile stresses come on the:
 - A. Pillars
 - B. Abutments
 - C. Roof
 - D. Stops
6. Dolomite is a:
 - A. Metamorphic rock mineral
 - B. Intrusive rock mineral
 - C. Extrusive rock mineral
 - D. Sedimentary rock mineral

7. The hardness of quartz in Moh's scale of hardness is:
 - A. 7
 - B. 6
 - C. 5
 - D. 6.5
8. For a vein like deposit having 60 degrees dip, the most appropriate primary opening is:
 - A. Adit
 - B. Tunnel
 - C. Shaft
 - D. Inclined
9. Tunnel Boring Machine can handle:
 - A. All type of strata
 - B. Particular Strata
 - C. Only Hard strata
 - D. Only soft strata
10. Centrifugal Pumps are used for:
 - A. Low head
 - B. High head
 - C. High discharge
 - D. Both A and C
11. All silicate minerals contain which two elements?
 - A. iron, silicon
 - B. silicon, sodium
 - C. Oxygen, carbon
 - D. Silicon, Oxygen
12. What is the biggest safety concern in mines?
 - A. Ventilation
 - B. Explosions
 - C. Earth Quakes
 - D. Rock out bursts
13. What is the cheapest way of mining?
 - A. Open-pit mining
 - B. Drift mining
 - C. Shaft mining
 - D. Strip mining
14. What is low grade brown coal called?
 - A. Bituminous
 - B. Anthracite
 - C. Lignite
 - D. None of the above
15. Which out of the following minerals occurs in the sands of valley floors and the base of hills?
 - A. Gold
 - B. Copper
 - C. Sulphur
 - D. Marble
16. The equipment that is NOT used in hard rock metal mining drivage is:
 - A. road header
 - B. drill jumbo
 - C. jack hammer
 - D. dint header

17. Equipment used in mining of placer deposits is:
 - A. auger
 - B. wagon drill
 - C. rope saw
 - D. riffle box
18. Geologists measure hardness is using:
 - A. Moh's Scale
 - B. Vernier scale
 - C. Reynold Number
 - D. Tough Number
19. Uranium resources can be extracted from the ground using:
 - A. open pit
 - B. underground
 - C. In-situ leach (ISL)
 - D. All of the above
20. Methane/Marsh gas is main problem in:
 - A. Copper mines
 - B. Uranium mines
 - C. Coal mines
 - D. None of the above

2.11 DPE – A20: Power Technology

1. In an actual turbine, the entropy of the working fluid entering the turbine is _____ the entropy of the working fluid leaving the turbine:
 - A. Greater than
 - B. Less than
 - C. Equal to
 - D. None of the above
2. Diesel engines have normally _____ compression ratios than petrol engines:
 - A. Lower
 - B. higher
 - C. Equal
 - D. None of these
3. _____ is equipped with a round device that holds several tools at once:
 - A. Turret lathe
 - B. Milling Machine
 - C. Hex lathe
 - D. Grinder`
4. The shaper is used primarily to produce _____ surfaces:
 - A. Flat
 - B. Curved
 - C. Protrude
 - D. Spherical
5. The wetness of steam at the exhaust of the turbine should be no greater than:
 - A. 10%
 - B. 15%
 - C. 20%
 - D. 25%

6. If two similar centrifugal pumps are connected in parallel then the net flow will be almost:
 - A. Same
 - B. Double
 - C. Half
 - D. None of them
7. In a nozzle when the sonic velocity is attained, ratio of the pressure at that section to the inlet pressure is called:
 - A. Throat pressure ratio
 - B. maximum pressure ratio
 - C. Critical pressure ratio
 - D. Choked pressure ratio
8. The process of the formation and subsequent collapse of vapor bubbles in a pump is called:
 - A. Surging
 - B. Cavitations
 - C. Knocks
 - D. Gas binding
9. The maximum cycle temperature of a steam plant is limited by considerations:
 - A. Pressure
 - B. Metallurgical
 - C. Plant size
 - D. Cost
10. In a heat exchanger, one fluid flows perpendicular to the second fluid:
 - A. Parallel flow
 - B. Counter flow
 - C. Cross flow
 - D. No such heat exchanger
11. A piston cylinder engine is an example of:
 - A. Control Mass System
 - B. Control Volume System
 - C. Isolated System
 - D. Open System
12. Which of the following operate on Brayton Cycle:
 - A. Steam Power Plant
 - B. Nuclear Power Plant
 - C. Gas Turbine
 - D. Diesel Engine
13. Charge in diesel engine consists of:
 - A. Air, Diesel And Lube Oil
 - B. Air And Diesel
 - C. Diesel And Lube Oil
 - D. Air
14. Which of the following does NOT involve adiabatic Process?
 - A. Compressor
 - B. Combustion Chamber
 - C. Gas Turbine
 - D. Pump
15. Combined Cycle Power Plant is a combination of:
 - A. Diesel Engine And Gas Turbine
 - B. Diesel Engine And Steam Turbine
 - C. Gas Turbine And Steam Turbine
 - D. Diesel Engine And Petrol Engine

16. The air fuel ratio of a petrol engine is controlled by:
 - A. Governor
 - B. Carburetor
 - C. Fuel pump
 - D. Fuel Injector
17. Which of the following is different from others?
 - A. Boiler
 - B. Feed Water Heat Exchanger
 - C. Evaporator
 - D. Condenser
18. Besides mean effective pressure, the data required to determine the indicated power of an engine include:
 - A. Piston Diameter, Length Of Stroke And Calorific Value Of Fuel
 - B. Specific Fuel Consumption, Speed Of Rotation And Torque
 - C. Piston Diameter, Specific Fuel Consumption And Calorific Value Of Fuel
 - D. Piston Diameter, Length Of Stroke And Speed Of Rotation
19. What type of heat exchanger is condenser of a steam power plant?
 - A. Parallel Flow Heat Exchanger
 - B. Cross Flow Heat Exchanger
 - C. Co-Current Heat Exchanger
 - D. Counter Current Heat Exchanger
20. An example of a water tube boiler is a:
 - A. Locomotive Boiler
 - B. Lancashire Boiler
 - C. Babcock – Wilcox Boiler
 - D. Cochran Boiler

2.12 DPE – A21: Refrigeration and Air Conditioning Technology

1. In a vapour compression refrigeration system the lowest temperature during the cycle occurs after:
 - A. Expansion
 - B. Evaporation
 - C. Condensation
 - D. Compression
2. Water as refrigerant is designated:
 - A. R-118
 - B. R-729
 - C. R-502
 - D. None of these
3. The refrigerant widely used in domestic refrigerators is:
 - A. Ammonia
 - B. R-11
 - C. R-12
 - D. R-22
4. An evaporator is also known as:
 - A. Freezing coil
 - B. Cooling coil
 - C. Chilling coil
 - D. All of these.
5. Thermostatic expansion valve is also called:
 - A. Constant pressure valve
 - B. Constant temperature valve
 - C. Constant superheat valve
 - D. Constant entropy valve

6. A mixture of dry air and water vapour, when the air has diffused the maximum amount of water vapour into it, is called:
 - A. Dry air
 - B. Moist air
 - C. Saturated air
 - D. Specific humidity.
7. The degree of warmth or cold felt by a human body depends mainly on:
 - A. Dry bulb temperature
 - B. Relative humidity
 - C. Air velocity
 - D. All of these.
8. In winter air conditioning, the air is:
 - A. Cooled and humidified
 - B. Cooled and dehumidified
 - C. Heated and humidified
 - D. Heated and dehumidified
9. The alignment circle is marked on the psychometric chart at:
 - A. 20°C DBT and 50% RH
 - B. 26 °C DBT and 50% RH
 - C. 20 °C DBT and 60% RH
 - D. 26 °C DBT and 60% RH
10. The point at which latent heat of a refrigerant becomes zero is called:
 - A. Zero point
 - B. Dew point
 - C. Flash point
 - D. Critical point
11. The liquid used in manometers should have:
 - A. low density
 - B. high density
 - C. low surface tension
 - D. high surface tension
12. Which of the following refrigerant has the maximum ozone depletion potential in the stratosphere?
 - A. Ammonia
 - B. Carbon dioxide
 - C. Sulphur dioxide
 - D. Fluorine
13. During sensible heating:
 - A. moisture content increases
 - B. dry bulb temperature and wet bulb temperature decrease
 - C. dew point temperature remains constant
 - D. relative humidity increases
14. The capillary tube is not used in large capacity refrigeration systems because:
 - A. cost is too high
 - B. capacity control is not possible
 - C. it is made of copper
 - D. required pressure drop cannot be achieved
15. Accumulator is used to collect liquid refrigerant and to prevent it from going to:
 - A. Compressor
 - B. Condenser
 - C. Expansion valve
 - D. Evaporator

16. The formation of frost on cooling coils in a refrigerator:
 - A. Increases heat transfer
 - B. Improves COP
 - C. Increases power consumption
 - D. Reduces power consumption
17. When the lower temperature of a refrigerating machine is fixed, then the COP can be improved by:
 - A. Operating the machine at higher speeds
 - B. Operating the machine at lower speeds
 - C. Raising the higher temperature
 - D. Lowering the higher temperature
18. One tonne of refrigeration means that the heat removing capacity is:
 - A. 21kJ/min
 - B. 420 kJ/min
 - C. 210 kJ/min
 - D. 620 kJ/min
19. A steam pipe is to be insulated with two layers of insulating materials of different thermal conductivities. For the minimum heat transfer:
 - A. The better insulation must be put inside
 - B. One could place either insulation on either side
 - C. One should take into account the steam temperature before deciding as to which insulation is put where.
 - D. The better insulation must be put outside
20. On the pressure-enthalpy (P-H) chart, condensation and desuperheating is represented by a horizontal line because the process:
 - A. involves no change in volume
 - B. takes place at constant temperature
 - C. takes place at constant enthalpy
 - D. takes place at constant pressure

2.13 DPE – A22: Welding Technology

1. The most readily welded steel is:
 - A. Low-carbon steel
 - B. Medium-carbon steel
 - C. High-carbon steel
 - D. Very high-carbon steel
2. Process of joining two dissimilar metals is called:
 - A. Gas welding process
 - B. Electric arc welding process.
 - C. Brazing
 - D. Soldering
3. Presence of porosity in welds is due to:
 - A. Gaseous produced by chemical reaction
 - B. Due to incomplete fusion
 - C. Due to thermal stresses
 - D. Due to Improper current
4. The angle between bevels in butt welds should be approximately:
 - A. 90 deg
 - B. 80 deg
 - C. 60 deg
 - D. 30 deg
5. The cost of the arc welding is increased by:
 - A. Use of smaller dia. Electrode
 - B. Careful fit-up
 - C. Use of positioning fixture
 - D. Use of set up fixture

6. A respirator would most likely be worn when welding:
 - A. Cast Iron
 - B. Galvanized Iron
 - C. Low-carbon steel
 - D. Aluminum
7. Incomplete penetration of a groove weld is most usually due to:
 - A. Welding speed too slow
 - B. Gap at the base of weld is too narrow
 - C. Electrode diameter too small
 - D. Welding current too large
8. The main reason for the use of flux is:
 - A. Remove oxides
 - B. Help the filler metal to adhere to the base metal
 - C. Prevent over heating of the base metal
 - D. Replace carbon lost from the metal during the welding process
9. One of the difficulties encountered in the oxyacetylene welding of aluminum is that aluminum:
 - A. Does not readily form an oxide coating
 - B. Melts without changing color
 - C. Welding requires large torch tip than those required for other metals
 - D. Must be pre-heated before it can be properly welded
10. The metal that is most difficult to weld is:
 - A. Nickel
 - B. Magnesium
 - C. Bronze
 - D. Copper
11. A welding process well accepted for aero, rocket, missile and nuclear industries is
 - A. GTAW
 - B. SAW
 - C. SMAW
 - D. None of the above
12. A process commonly used for long seams in ship building and pressure vessel fabrication is
 - A. SMAW
 - B. SAW
 - C. EBW
 - D. GTAW
13. A welding process mainly employed for the welding of reactive metals is
 - A. SMAW
 - B. SAW
 - C. GTAW
 - D. None of the above
14. Resistance of a welding cable depends upon
 - A. Material
 - B. Cross-sectional Area
 - C. Temperature
 - D. All of the above
15. Sheet metal less than 3 mm thickness (<3mm) can be welded best by
 - A. GTAW
 - B. FCAW
 - C. Laser welding
 - D. All of the above

16. Lap welds in sheet metal can be easily made by
 - A. Resistance spot and seam welding
 - B. SAW
 - C. SMAW
 - D. GTAW
17. GTAW stands for
 - A. General Thickness Arc welding
 - B. Gas Technology Arc Welding
 - C. Gas Tungsten Arc Welding
 - D. None of the above
18. In GTAW, SHIELDING Gas used is
 - A. Inert Gas
 - B. Reactive Gas
 - C. CO₂ Gas
 - D. none of the above
19. Autogenous Welding is
 - A. That welding in which Filler metal is not used
 - B. That welding in which Filler metal is used
 - C. Both a & b
 - D. None of the above
20. In GTAW process, Shielding gas flows from
 - A. Torch to Nozzle
 - B. Nozzle to Torch
 - C. Base metal to Nozzle
 - D. none of the above

2.14 DPE – A23: Auto and Diesel Technology

1. Efficiency of four cycle diesel engine is about:
 - A. 90 to 95 %
 - B. 50 to 60 %
 - C. 80 to 90%
 - D. None of the above
2. Which of the following is not the function of fly Wheel:
 - A. It connects the piston to the crank shaft
 - B. It is the mounting surface used to bolt engine up to its load
 - C. It has gear teeth that allow starting motor to engage
 - D. It reduces vibration
3. A diesel engine has compression ratio range from:
 - A. 10:1 to 11: 2
 - B. 14:1 to 24:1
 - C. 20:1 to 34:1
 - D. None of these
4. Turbo charging is used to force the _____ air into the cylinder:
 - A. Hot air
 - B. Exhaust air
 - C. Fresh air
 - D. Fuel
5. The ratio of engine`s brake horsepower and its indicated horsepower is called _____ of the engine:
 - A. Fuel efficiency
 - B. Mechanical efficiency
 - C. Engine efficiency
 - D. Maximum efficiency

6. The diesel engines are also known as _____ engines:
 - A. Spark ignition
 - B. Combustion ignition
 - C. Efficient ignition
 - D. Compression ignition
7. In a four stroke cycle, the minimum temperature inside the engine cylinder occurs at the:
 - A. Beginning of Suction Stroke
 - B. End of Suction Stroke
 - C. Beginning of Exhaust Stroke
 - D. End of Exhaust Stroke
8. In diesel engines, the injected fuel is ignited due to:
 - A. High Temperature of Fuel
 - B. High Temperature of Cylinder
 - C. High Temperature of Compressed Air
 - D. High temperature of Exhaust Air
9. The object of supercharging the engine is:
 - A. To reduce mass of the engine per brake power
 - B. To reduce space occupied by the engine
 - C. To increase the power output of an engine when greater power is required
 - D. All of the above
10. The injection pressure in a diesel engine is about:
 - A. 10 bar
 - B. 100 bar
 - C. 200 bar
 - D. 300 bar
11. Which of the following operate on Brayton Cycle:
 - A. Steam Power Plant
 - B. Nuclear Power Plant
 - C. Gas Turbine
 - D. Diesel Engine
12. Charge in diesel engine consists of:
 - A. Air, Diesel And Lube Oil
 - B. Air And Diesel
 - C. Diesel And Lube Oil
 - D. Air
13. Which of the following does NOT involve adiabatic process?
 - A. Compressor
 - B. Combustion Chamber
 - C. Gas Turbine
 - D. Pump
14. In a six cylinder 4 stroke petrol engine running at 2000 rpm, the cam shaft runs at:
 - A. 1000 Rpm
 - B. 2000 Rpm
 - C. 8000 Rpm
 - D. 500 Rpm
15. Removal of burnt gases from a 2 stroke engine cylinder is known as:
 - A. Detonation
 - B. Primary Ignition
 - C. Scavenging
 - D. Supercharging

16. The air fuel ratio of a petrol engine is controlled by:
 - A. Governor
 - B. Carburetor
 - C. Fuel pump
 - D. Fuel Injector
17. Which is NOT an example of internal combustion engine?
 - A. Steam Turbine
 - B. Gas Turbine
 - C. Diesel Engine
 - D. None of the above
18. Accumulation of rust and scale in the engine cooling system will cause :
 - A. Slow warm up
 - B. Reduce output
 - C. Low exhaust temperature
 - D. Over heating
19. Which of the following system of automobile uses rack and pinion gears?
 - A. Support system
 - B. Suspension system
 - C. Steering system
 - D. Breaking system
20. The breaking up of a liquid into fine droplets by spraying is called:
 - A. Vaporization
 - B. Atomization
 - C. Venturi effect
 - D. Osmosis

2.15 DPE – A24: Boiler Technology

1. Which is an example of closed system?
 - A. Air compressor
 - B. Liquid cooling system of an automobile
 - C. Boiler
 - D. None of these
2. In a boiler, feed water supplied per hour is 205 kg while coal fired per hour is 23 kg. The net enthalpy rise is 725 kJ for every 5 kg of water. If the calorific value of the coal is 2050 kJ/kg, then the boiler efficiency will be?
 - A. 56%
 - B. 74%
 - C. 63%
 - D. 78%
3. The chemical oxygen demand (COD) measures the:
 - A. amount of oxygen required for growth of microorganisms in water
 - B. amount of oxygen that would be removed from the water in order to oxidize pollution
 - C. amount of oxygen required to oxidize the calcium present in waste water
 - D. none of the above
4. Permanent hard water may be softened by passing it through:
 - A. sodium silicate
 - B. sodium bicarbonate
 - C. sodium hexametaphosphate
 - D. sodium phosphate
5. Temporary hardness of water is caused by the presence of:
 - A. chlorides of calcium and magnesium
 - B. sulfates of calcium and magnesium
 - C. bicarbonates of calcium and magnesium
 - D. carbonates of sodium and potassium

6. As commonly known, ONE (01) hp boiler has heating surface of _____ Sq ft:
- 08
 - 10
 - 12
 - None of above
7. Permanent hardness of water is caused by the presence of:
- bicarbonates of calcium and magnesium
 - carbonates of sodium and potassium
 - chlorides and sulfates of calcium and magnesium
 - phosphates of sodium and potassium
8. Which of the following chemical is sometime added in the process of coagulation and flocculation?
- Aluminum sulphate
 - Aluminum oxide
 - Calcium chloride
 - None of these
9. BOD stands for:
- biochemical oxygen demand
 - British oxygen demand
 - British oxygen depletion
 - biological oxygen depletion
10. Pick out the wrong statement:
- Caustic embrittlement of boiler's metallic parts is caused by high concentration of caustic soda in boiler feed water.
 - Cooling and freezing of water kills the bacteria present in it.
 - With increasing boiler operating pressure of steam, the maximum allowable concentration of silica in feed water goes on decreasing.
 - Dissolved oxygen content in high pressure boiler feed water should be nil.
11. Boiler is a special type of _____.
- Vessel
 - Heat Exchanger
 - Evaporator
 - Distillation Column
12. In fire tube boilers, water is on _____.
- Shell Side
 - Tube Side
 - Chimney
 - None of the above
13. The main objective of a pressure control in a boiler is to :
- Produce Steam
 - Pressure Control of Steam
 - Blowdown Control
 - Flame Control
14. SiO_2 is the major contributor in boilers toward:
- High Fuel Consumption
 - Scale Formation
 - Low steam Quality
 - Moisture in Steam
15. N_2H_4 is added in Boiler Feed Water as an:
- Oxidizing Agent
 - pH Control Agent
 - O_2 Scavenging Agent
 - Steam Moisture Control Agent

16. Heavy oil is also commonly known as:
 - A. Diesel
 - B. Kerosene
 - C. Lube Oil
 - D. Furnace Oil
17. Boiler of a PWR nuclear power plant, is also known as:
 - A. BWR
 - B. Steam generator
 - C. Evaporator
 - D. Reactor Pressure Vessel
18. Draught is necessary for boilers to provide:
 - A. Air for fuel
 - B. Fuel for combustion
 - C. Water
 - D. Blowdown
19. Pulverized coal fired boilers, commonly used in coal power plants, have a higher efficiency but a costly:
 - A. Boiler Feedwater
 - B. Fuel
 - C. SO_x and NO_x control
 - D. None of the above
20. Most cement manufacturing plants use _____ to recover heat releasing from preheater towers toward atmosphere.
 - A. Fire tube boilers
 - B. Waste heat boilers
 - C. Blast Furnace
 - D. All of the above

2.16 DPE-A25: Machine Shop (Mechanical)

1. The cutting action of the shaper machine occurs only on the stroke of ram:
 - A. Forward
 - B. Backward
 - C. Middle
 - D. End
2. Shaper machine size is determined by the:
 - A. H.P. of Motor
 - B. Diameter of Bull wheel
 - C. Max. stroke length of ram
 - D. None of above
3. V-blocks are commonly used as work holding device for shafts which are:
 - A. Square
 - B. Rectangle
 - C. Elliptical
 - D. Cylindrical
4. Turning of metals in a machine shop is usually performed on a:
 - A. Radial Drill machine
 - B. Milling machine
 - C. Grinding machine
 - D. Lathe machine
5. The speed rate in lathe operations is usually expressed as:
 - A. R.P.M. of work piece
 - B. mm/Minute
 - C. mm/revolution
 - D. Surface meter

6. When taking finish cut the lathe machine should be operated at:
 - A. Low speed
 - B. Medium speed
 - C. Higher speed
 - D. Any speed
7. Tail stock centers which do not revolve with the work piece are:
 - A. Revolving centers
 - B. Dead centers
 - C. Live centers
 - D. Magnetic centers
8. The angle of a standard metrics form of thread is:
 - A. 30°
 - B. 60°
 - C. 45°
 - D. 90°
9. Discontinuous chips are normally formed when turning metals such as:
 - A. Mild steel
 - B. Aluminum
 - C. Cast Iron
 - D. H.S.S
10. Lathe machine tool is considered as:
 - A. Single point cutting tool
 - B. Multi point cutting tool
 - C. Multi edge cutting tool
 - D. None of above
11. Segmental chips are formed during machining:
 - A. mild steel
 - B. cast iron
 - C. high speed steel
 - D. high carbon steel
12. If the diameter of the hole is subject to considerable variation, then for locating in jigs and fixtures, the pressure type of locator used is:
 - A. conical locator
 - B. cylindrical locator
 - C. diamond pin locator
 - D. V-locator
13. Side rake angle of a single point cutting tool is the angle:
 - A. by which the face of the tool is inclined towards back
 - B. by which the face of the tool is inclined sideways
 - C. between the surface of the flank immediately below the point and a plane at right angles to the center line of the point of the tool
 - D. between the surface of the flank immediately below the point and a line drawn from the point perpendicular to the base
14. Internal gears can be made by
 - A. hobbing
 - B. shaping with pinion cutter
 - C. shaping with rack cutter
 - D. milling
15. Which of the following operation is first performed?
 - A. Spot facing
 - B. Boring
 - C. Tapping
 - D. Drilling

16. The size of a lathe is specified by:
 - A. length between centers
 - B. swing diameter over the bed
 - C. swing diameter over the carriage
 - D. All of the above
17. In a bilateral system of tolerance, the tolerance is allowed on
 - A. one side of the actual size
 - B. one side of the nominal size
 - C. both sides of the actual size
 - D. both sides of the nominal size
18. The silicon carbide abrasive is chiefly used for grinding
 - A. cemented carbide
 - B. ceramic
 - C. cast iron
 - D. All of the above
19. Drilling is an example of
 - A. orthogonal cutting
 - B. oblique cutting
 - C. simple cutting
 - D. uniform cutting
20. When the cutting edge of the tool is dull, then during machining
 - A. continuous chips are formed
 - B. discontinuous chips are formed
 - C. continuous chips with built-up edge are formed
 - D. no chips are formed

2.17 DPE- A26: Mechanical (Drafting & Designing)

1. The primary unit of measurement for engineering drawings and design in the mechanical industries is the:
 - A. Millimeter
 - B. Centimeter
 - C. Meter
 - D. Kilometer
2. This is how axonometric, oblique, and perspective sketches show objects:
 - A. Orthographically
 - B. Pictorially
 - C. Obliquely
 - D. Parallel
3. Draftsman should use a _____ in a section view of a mechanical part that includes the cylindrical view of a threaded hole:
 - A. Center line
 - B. Hatch line
 - C. Poly line
 - D. Dimension line
4. In offset sections, offsets or bends in the cutting plane are all:
 - A. 90 degrees
 - B. 180 degrees
 - C. Either 90 or 180 degrees
 - D. 30, 60, or 90 degrees

5. The _____ tool on the Dimension tool bar places the length of an arch on a drawing:
 - A. Arc Radius
 - B. Arc Length
 - C. Radius
 - D. Diameter
6. How can the draftsman prevent AutoCAD from placing or stacking another center mark on a circle when adding a diameter dimension to it?
 - A. Explode the dimension and then erase the center mark.
 - B. Use the Properties dialog box to turn off the center mark of the dimension.
 - C. It can't be done.
 - D. Use the trim tool to take away the stacked center mark.
7. This is the term for the range of tightness or looseness resulting from the allowances and tolerances in mating parts:
 - A. Limits
 - B. Fit
 - C. Specifications
 - D. Allowance
8. This is the theoretically exact size from which limits of size are determined:
 - A. Actual Size
 - B. Dimensioned size
 - C. Production size
 - D. Basic size
9. When filling an area with a hatch pattern in AutoCAD the draftsman needs to be able to _____.
 - A. see the entire bounding area to hatch
 - B. set Ortho on
 - C. turn ISO grid off
 - D. set the layer to Defpoints
10. These breaks are used to shorten the view of an object:
 - A. Section breaks
 - B. Aligned breaks
 - C. Conventional breaks
 - D. Full breaks
11. Which of the following is not included in title block of drawing sheet?
 - A. Sheet number
 - B. Size of sheet
 - C. Scale
 - D. Method of projection
12. Which of the following represents reducing scale?
 - A. 1:1
 - B. 1:2
 - C. 2:1
 - D. 10:1
13. In first angle projection method, object is assumed to be placed in:
 - A. First quadrant
 - B. Second quadrant
 - C. Third quadrant
 - D. Fourth quadrant

14. The following line is used for visible outlines:
- Continuous thick
 - Continuous thin
 - Chain thin line
 - Short zigzag thin
15. The dotted lines represents:
- Hidden edges
 - Projection line
 - Centre line
 - Hatching line
16. Hatching lines are drawn at ____ degree to reference line:
- 30
 - 45
 - 60
 - 90
17. Metric thread of 10mm diameter is represented by:
- 10M
 - M10
 - M¹⁰
 - None of the above
18. The internal angle of regular pentagon is _____ degree.
- 72
 - 108
 - 120
 - 150
19. A line of 1 meter is shown by 1cm on a scale. Its Representative Fraction (RF) is:
- 1
 - 100
 - 1/100
 - 1/50
20. A point 'P' is above Horizontal Plane (HP) and in front of Vertical Plane (VP). The point is in:
- First quadrant
 - Second quadrant
 - Third quadrant
 - Fourth quadrant

2.18 DPE – A27: Auto and Farms Technology

- Which is NOT an example of internal combustion engine?
 - Steam Turbine
 - Gas Turbine
 - Diesel Engine
 - None of the above
- The material that is left by the harvesting machine in row is:
 - Swath
 - Stubble
 - Straw
 - All are correct

3. A machine used to cut crops and deliver them in a uniform manner in a row is:
 - A. Combine
 - B. Mower
 - C. Reaper binder
 - D. Windrower
4. Turbo charging is used to force the _____ air into the cylinder:
 - A. Hot air
 - B. Exhaust air
 - C. Fresh air
 - D. Fuel
5. In diesel engines, the injected fuel is ignited due to:
 - A. High Temperature of Fuel
 - B. High Temperature of Cylinder
 - C. High Temperature of Compressed Air
 - D. High temperature of Exhaust Air
6. The object of supercharging the engine is:
 - A. To reduce mass of the engine per brake power
 - B. To reduce space occupied by the engine
 - C. To increase the power output of an engine when greater power is required
 - D. All of the above
7. Which of the following operate on Brayton Cycle:
 - A. Steam Power Plant
 - B. Nuclear Power Plant
 - C. Gas Turbine
 - D. Diesel Engine
8. Charge in diesel engine consists of:
 - A. Air, Diesel And Lube Oil
 - B. Air And Diesel
 - C. Diesel And Lube Oil
 - D. Air
9. Which of the following does NOT involve adiabatic process?
 - A. Compressor
 - B. Combustion Chamber
 - C. Gas Turbine
 - D. Pump
10. In a six cylinder 4 stroke petrol engine running at 2000 rpm, the cam shaft runs at:
 - A. 1000 Rpm
 - B. 2000 Rpm
 - C. 8000 Rpm
 - D. 500 Rpm
11. Removal of burnt gases from a 2 stroke engine cylinder is known as:
 - A. Detonation
 - B. Primary Ignition
 - C. Scavenging
 - D. Supercharging

12. The air fuel ratio of a petrol engine is controlled by:
- A. Governor
 - B. Carburetor
 - C. Fuel pump
 - D. Fuel Injector
13. A tractor drawn in semi-mounted mower is operated by:
- A. Belt pulley drive
 - B. Tractor hydraulic
 - C. Tractor power take off
 - D. Tractor hitch
14. The two-stroke engine is:
- A. Diesel engine
 - B. Steam engine
 - C. Petrol engine
 - D. None of the above
15. The diesel engine used on tractors are:
- A. One-stroke engine
 - B. Two-stroke engine
 - C. Four stroke engine
 - D. None of the above
16. The carburetor is main part of:
- A. Diesel engine
 - B. Steam engine
 - C. Petrol engine
 - D. Gas engine
17. Diesel engine works on principle of:
- A. Diesel cycle
 - B. Otto cycle
 - C. Carnot cycle
 - D. None of the above
18. The injector and fuel pump are the heart of:
- A. Diesel
 - B. Steam engine
 - C. Petrol engine
 - D. Gas engine
19. In four-stroke cycle engine, one power stroke is obtained after every:
- A. Half revolution of crankshaft
 - B. One revolution of crankshaft
 - C. Two revolution of crankshaft
 - D. Three revolution of crankshaft
20. The injection pressure in a diesel engine is about:
- A. 10 bar
 - B. 100 bar
 - C. 200 bar
 - D. 300 bar

2.19 DPE – A31: Biology

1. In word biology, bio mean:
 - A. Sky
 - B. Earth
 - C. Man
 - D. life
2. Biology word is derived from:
 - A. English
 - B. Urdu
 - C. Latin
 - D. Greek
3. Biology is a science of:
 - A. Metal
 - B. Gasses
 - C. Life and living organisms
 - D. Buildings
4. Expert dealing with living things is known as:
 - A. Engineer
 - B. Medical doctor
 - C. Biologist
 - D. None of these
5. Cytology deals with:
 - A. Plant root
 - B. Animal skins
 - C. Chromosomes
 - D. Plasma
6. Study of plant is:
 - A. Chemistry
 - B. Biology
 - C. Physics
 - D. Botany
7. Molecular biology deals with:
 - A. Mines
 - B. Sea
 - C. DNA
 - D. Metals
8. The study of insects is more relevant to:
 - A. Physics
 - B. Chemistry
 - C. Zoology
 - D. Botany
9. Zoology deals with:
 - A. Plants
 - B. Soil
 - C. Sea
 - D. Animals
10. Angiosperms are:
 - A. Plants
 - B. Cell
 - C. Animals
 - D. Insects
11. Proteins are made of amino acids linked together by specific bonds called:
 - A. Peptide bonds
 - B. Nitrogen bonds
 - C. Hydrogen bonds
 - D. Hydrogen & Nitrogen bonds

12. Changes in the nucleotide sequence of DNA which aren't passed to offspring occur in:
 - A. Eggs & sperm cells
 - B. Non-sexual cells
 - C. Diploid and haploid cells
 - D. All of the above
13. The genetic changes that occur in more than 1 percent of the population are:
 - A. Polymorphisms
 - B. Monotheism
 - C. Frame shift mutation
 - D. None of above
14. Bos indicus is the scientific name of:
 - A. Goat
 - B. Sheep
 - C. Buffalo
 - D. Cow
15. Which of the following disease combination is caused by virus?
 - A. Influenza, Dengue, AIDS
 - B. Influenza, Kala azar, Haemophilia
 - C. Sleeping sickness, Kala azar, Dengue
 - D. Influenza, Kala azar, Dengue
16. Which of the following is generally true about Antibiotics?
 - A. Are toxic to bacteria
 - B. Directly kills the bacteria
 - C. Blocks biochemical pathways of bacteria
 - D. Suffocates the bacteria
17. Common cold, Pneumonia and Tuberculosis are:
 - A. Air borne diseases
 - B. Water borne diseases
 - C. Soil borne diseases
 - D. Vector borne diseases
18. The immune system:
 - A. Fights and kills pathogens
 - B. Develops antibodies for future attacks
 - C. Remembers previous infections
 - D. All of the above
19. Eukaryotic unicellular organisms are grouped in the kingdom:
 - A. Monera
 - B. Protista
 - C. Fungi
 - D. Plantae
20. An organism having some characteristics of plant and animal kingdom is:
 - A. Paramecium
 - B. Amoeba
 - C. Euglena
 - D. Giraffe

2.20 DPE – A32: Chemistry

1. 1.0 g of pure calcium carbonate was found to require 50ml of dilute HCl for complete reaction. The strength of HCl is given by :
 - A. 4 N
 - B. 2 N
 - C. 0.4 N
 - D. 0.2 N

2. A 499 mg sample of $\text{CuSO}_4 \cdot n\text{H}_2\text{O}$ is heated to drive off the water hydration and then reweighed to give a final mass of 319 mg. Given that the sample contains 2.0 mol of Cu. What is average number of water of hydration, $\text{CuSO}_4 \cdot n\text{H}_2\text{O}$?
- A. 2
 - B. 5
 - C. 10
 - D. 18
3. A 13 gram gaseous sample of an unknown hydrocarbon occupies a volume of 11.2 L at STP. What is the hydrocarbon?
- A. CH_4
 - B. C_2H_2
 - C. C_4H_4
 - D. C_3H_5
4. Which has the minimum number of protons?
- A. Li
 - B. Na
 - C. K
 - D. Rb
5. If the actual mass of ^{39}K is 39.32197 amu per atom then the mass deficiency for ^{39}K is:
- A. 0.00110 amu
 - B. 1.0073 amu
 - C. 1.0087 amu
 - D. None of these
6. What is the largest number of protons that can exist in a nucleus and still be stable?
- A. 83
 - B. 206
 - C. 92
 - D. 84
7. Which of the following would have a pH of more than 7?
- A. ammonia solution
 - B. sodium chloride solution
 - C. pure water
 - D. carbonic acid
8. A solution that is able to resist changes in the pH when small amounts of an acid or base are added is called:
- A. neutral solution
 - B. saturated solution
 - C. balanced solution
 - D. buffer solution
9. Which of the following molecules has no net dipole moment?
- A. HCl
 - B. H_2O
 - C. CCl_4
 - D. CH_3Cl

10. Which has largest first ionization energy?
- A. Li
 - B. Na
 - C. K
 - D. Rb
11. Substance A has a pH of 2 and substance B has a pH of 3. This means that:
- A. substance A has more basic properties than substance B.
 - B. Substance B has more acidic properties than substance A.
 - C. substance A is ten times more acidic than substance B.
 - D. As the temperature of water decreases, the solubility of carbon dioxide gas in the water
12. Covalent bonds are least likely to be formed:
- A. between atoms of the same element
 - B. between atoms of different elements on the right of the periodic table
 - C. by head of the group elements with high ionization energies
 - D. between an element in Group I and an element in Group VII
13. A compound is more likely to be covalent if the:
- A. cation has a small size and a high charge
 - B. anion has a small size and a high charge
 - C. cation has a large size and a small charge
 - D. anion has a small size and a small charge
14. Which one of the following is not true of metallic bonding?
- A. between atoms of the same element
 - B. between atoms of different elements on the right of the periodic table
 - C. by head of the group elements with high ionization energies
 - D. the strength of metallic bonding affects the boiling point of metals
15. Niels Bohr is credited with what scientific contribution?
- A. The discovery of the electron
 - B. The observation that matter emits light
 - C. The discovery of the equation $E = hv$
 - D. The theory that electrons in atoms are arranged in shells with discrete energies
16. How many electrons are added to an atom in the buildup process before the start of the fifth shell?
- A. $n=3, l=0$
 - B. $n=4, l=1$
 - C. $n=3, l=2$
 - D. $n=4, l=2$
17. As the temperature of water decreases, the solubility of carbon dioxide gas in the water:
- A. increases
 - B. decreases
 - C. remains the same
 - D. increases or decreases, depending on the specific temperature
18. The basis for the C-14 dating method is that:
- A. C-14 is very unstable and is readily lost from the atmosphere.
 - B. Living tissue will not absorb C-14 but will absorb C-12
 - C. The ratio of C-14 to C-12 in the atmosphere is a constant
 - D. The amount of C-14 in all objects is the same

19. The solution concentration terms of parts per million, percent by volume, and percent by weight are concerned with the amount of:
- solvent in the solution seawater
 - solute in the solution
 - solute compared to solvent
 - solvent compared to solute
20. In period, which of the following decreases?
- Atomic radius
 - Ionization energy
 - electron affinity
 - electronegativity

2.21 DPE – A33: Geology

- Gypsum indicates
 - Lacustrine Environments
 - Oceanic Environments
 - Continental environments
 - Igneous environments
- The process of building up of a surface by deposition is called:
 - Degradation
 - Aggradations
 - Up gradation
 - Low gradation
- What type of fault is characterized by horizontal movement?
 - Strike Slip Fault
 - Dip Slip Fault
 - Oblique Slip fault
 - Transform Fault
- Where do most of the sediments get deposited?
 - On continental shelf & adjacent ocean floor
 - In lakes
 - Along streams
 - In deserts
- Which is an example of a divergent tectonic plate boundary?
 - Mid Atlantic Ridge
 - San Andrews
 - Mississippi River
 - Japanese Trench
- Pelagic Sediments are:
 - Fine grained
 - Deposited far away from continental margins
 - Settle down very slowly on the sea floor
 - All of above
- Most of the world's earthquakes occur at:
 - Divergent Plate Boundaries
 - Convergent Plate Boundaries
 - Mid Oceanic Ridges
 - Mountain Ridges
- Which of the following is not dip slip fault?
 - A right lateral fault
 - A normal fault
 - A thrust fault
 - A reverse fault

9. Of the following metamorphic rocks, which one is formed at the highest temperature:
 - A. Slate
 - B. Marble
 - C. Schist
 - D. Eclogite
10. Granite is:
 - A. Silica poor rock
 - B. Silica rich rock
 - C. A metamorphic rock
 - D. Is a basic rock
11. Halite is the name of:
 - A. White Cement
 - B. Iron ore
 - C. Common Salt
 - D. A clay
12. NGR stands for:
 - A. National Geologic Reference
 - B. National Grid Reference
 - C. National Geographic Reference
 - D. National Group Reference
13. Potwar Plateau is bounded to the east by
 - A. Jhelum River
 - B. Indus River
 - C. Chenab River
 - D. Ravi River
14. What is the scientific term for a crack along which no appreciable movement has occurred:
 - A. Fault
 - B. Joint
 - C. Horizon
 - D. Axis
15. Clay minerals can be easily identified by:
 - A. Microscope
 - B. XRD
 - C. Hand lens
 - D. Magnifying glass
16. Himalayas are the product of collision between:
 - A. Arabian plate and Afghan Block
 - B. Indian plate Euro-Asian plate
 - C. African plate Euro-Asian plate
 - D. Antarctic plate and North American plate
17. Contour is a:
 - A. Line showing points of different heights
 - B. Line showing points of same heights
 - C. Indicates hill tops
 - D. Indicates a deep basin
18. Scintillation Counter detects:
 - A. Alpha particles
 - B. Beta Particles
 - C. Gamma Particles
 - D. Electromagnetic waves

19. In Pakistan uranium is found in:

- A. In Siwaliks
- B. In Dunites
- C. In Peridotites
- D. In limestones

20. Sandstone is formed by:

- A. volcanic activity
- B. igneous activity
- C. sedimentation
- D. metamorphism

2.22 DPE – A34: Mathematics

1. Which one of the following is discrete data?

- A. Sam is 160 cm tall
- B. Sam has two brothers and one sister
- C. Sam weighs 60 kg
- D. Sam ran 100 meters in 10.2 seconds

2. Which one of the following is NOT quantitative data?

- A. The snake is 7 feet long
- B. The snake has two eyes
- C. The snake is green and yellow
- D. The snake has no legs

3. A set S has a power set with 512 members. How many members does S have?

- A. 9
- B. 11
- C. 12
- D. 512

4. For the set $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K\}$, how many members will the power set have?

- A. 169
- B. 4096
- C. 8192
- D. 16384

5. What is the determinant of the matrix $A = \begin{bmatrix} 2 & 0 & -1 \\ 3 & 5 & 2 \\ -4 & 1 & 4 \end{bmatrix}$?

- A. 13
- B. 21
- C. 53
- D. 59

6. Areebah, Abdullah, and Areesha all shopped in the same store.

Areebah bought 2 apples, 3 bananas, and 1 coconut, and paid a total of Rs 4.50.

Abdullah bought 1 apple, 4 bananas, and 2 coconuts, and paid a total of Rs 6.70.

Areesha bought 3 apples, 1 banana, and 3 coconuts, and paid a total of Rs.

8.80. What was the cost of 1 coconut in this store?

- A. Rs. 2.00
- B. Rs. 2.10
- C. Rs. 2.20
- D. Rs. 2.30

7. The area of a right-angled triangle is 20 cm² and one of the sides containing the right angle is 4 cm. What is the altitude on the hypotenuse in cm?

- A. 2 B. $\frac{20}{\sqrt{26}}$ C. $\frac{2}{\sqrt{26}}$ D. $2\sqrt{29}$

8. If $x - y = 3$ and $x + 2y = 6$ are the diameters of a circle, what are the coordinates of the center of the circle?

- A. (0, 0)
 B. (2, 2)
 C. (1, -1)
 D. (4, 1)

9. What is $(-\infty, 0] \cap [0, +\infty)$?

- A. \emptyset
 B. $\{0\}$
 C. $\mathbb{R} - \{0\}$
 D. \mathbb{R}

10. $S = \{0, 1, 4, 9, 16, \dots\}$, what is S, expressed in set builder notation?

- A. $S = \{x^2, x \in \mathbb{N} \mid x \geq 0\}$
 B. $S = \{x^2, x \in \mathbb{W} \mid x \geq 0\}$
 C. $S = \{x^2, x \in \mathbb{W} \mid x \geq 1\}$
 D. $S = \{x^2, x \in \mathbb{R} \mid x \geq 0\}$

11. Solve $5 \log z(0.6) = 6$ to find the value of z to 3 decimal places.

- A. 0.653
 B. 0.635
 C. 0.542
 D. 0.500

12. What is the 5th term in the expansion of $(x + 2)^7$ in decreasing powers of x?

- A. $84x^5$
 B. $280x^4$
 C. $280x^3$
 D. $560x^3$

13. Which of the following pairs of numbers is NOT co-prime?

- A. 25 and 28
 B. 35 and 38
 C. 45 and 48
 D. 55 and 58

14. The sum and product of the roots of a quadratic equation are 7 and 12 respectively. What is the quadratic equation?

- A. $X^2 - 7x + 12 = 0$
 B. $X^2 + 7x + 12 = 0$
 C. $X^2 - 7x - 12 = 0$
 D. $X^2 + 7x - 12 = 0$

15. If $\begin{pmatrix} X^2 \\ Y^2 \end{pmatrix} - 3 \begin{pmatrix} X \\ 2Y \end{pmatrix} = \begin{pmatrix} -2 \\ -9 \end{pmatrix}$, then what are the values of x and y?

- A. $X = 1$ or 2 and $y = -3$
 B. $X = -1$ or 2 and $y = 3$
 C. $X = 1$ or -2 and $y = 3$
 D. $X = 1$ or 2 and $y = 3$

16. If $x = ya$, $y = zb$, $z = xc$, then the value of $a.b.c$ is?
- 1
 - $X.y.z$
 - $(x. Y. Z)^{abc}$
 - 0
17. One complete turn is the same as?
- $\pi/2$ rads
 - π rads
 - $3 \pi/2$ rads
 - 2π rads
18. If $x < 0$ and $y > 0$, then in which quadrant the point P (x, y) lies?
- 1st
 - 2nd
 - 3rd
 - 4th
19. What is the value of angle (θ) when $\text{Sin } \theta = \text{Cos } \theta$?
- 30deg
 - 45deg
 - 60deg
 - 90deg
20. A heptagon is polygon having _____ number of sides.
- 5
 - 6
 - 7
 - 8

2.23 DPE – A35: Physics

- Which of Newton's Law says "For every action there is an equal and opposite reaction":
 - Newton's First Law
 - Newton's Second Law
 - Newton's Third Law
 - All of the above
- What happens to a stream of alpha particles that is shot at a thin sheet of gold foil?
 - All of the particles pass straight through
 - A few of the particles bounce back at 180°
 - All of the particles bounce back at 180°
 - Most of the particles are absorbed by the foil
- Which has the greater momentum: a large object moving slowly or a small object moving fast?
 - Can't determine from the information given
 - The small object
 - The large object
 - The momentum is the same
- What is another name for the Newton's first law of motion?
 - Law of Acceleration
 - Law of Velocity
 - Law of Inertia
 - Law of Mass

5. Which of the Newton's laws of motion best explains how rockets work?
 - A. First Law
 - B. Second Law
 - C. Third Law
 - D. Gravitational Law
6. Accuracy is defined as:
 - A. A measure of how often an experimental value can be repeated.
 - B. The closeness of a measured value to the real value.
 - C. The number of significant figures used in a measurement.
 - D. None of these
7. How many significant figures are present in the number 10,450?
 - A. three
 - B. four
 - C. five
 - D. none of these
8. What is the appropriate SI unit for distance?
 - A. centimeters
 - B. inches
 - C. meters
 - D. kilometers
9. Which of the following is a unit of time?
 - A. Lunar Month
 - B. Candela
 - C. Light year
 - D. Both A) & C)
10. Vector A has a magnitude of 9 and points due north, vector B has a magnitude of 3 and points due north, and vector C has a magnitude of 5 and points due west. What is the magnitude of the resultant vector, $\mathbf{A} + \mathbf{B} + \mathbf{C}$?
 - A. 10
 - B. 11
 - C. 12
 - D. 13
11. An athlete runs four laps of a 400 m track. What is the athlete's total displacement?
 - A. -400 m
 - B. 0 m
 - C. 400 m
 - D. 1600 m
12. A ball is dropped from the top of a building. Taking air resistance into account, which best describes the speed of the ball while it is moving downward?
 - A. It will increase at a steady rate
 - B. It will remain constant
 - C. It will decrease
 - D. Its rate of acceleration will decrease until the ball moves at a constant speed
13. What happens to a stream of alpha particles that is shot at a thin sheet of gold foil?
 - A. All of the particles pass straight through
 - B. A few of the particles bounce back at 180°
 - C. All of the particles bounce back at 180°
 - D. Most of the particles are absorbed by the foil

14. Which has the greater momentum: a large object moving slowly or a small object moving fast?
 - A. Can't determine from the information given
 - B. The small object
 - C. The large object
 - D. The momentum is the same
15. When performing the calculation $34.530\text{g} + 12.1\text{g} + 1\ 222.34\text{g}$, the final answer must have:
 - A. Three decimal places
 - B. Three significant figures
 - C. Units of g^3
 - D. Only one decimal place
16. The speed of a dog running through a yard covering 24m in 52s is:
 - A. 0.54m/s
 - B. 2.2m/s
 - C. 0.46m/s
 - D. None of the above
17. The x and y components of a displacement vector are 1.15 m and 8.24 m respectively. What angle does the vector make with the x axis?
 - A. 78°
 - B. 80°
 - C. 82°
 - D. 84°
18. A brick dropped from a roof hits the ground 3.64 seconds later. Approximately how high was the roof?
 - A. 55 m
 - B. 60 m
 - C. 65 m
 - D. 70 m
19. On average, fission of a uranium nucleus gives:
 - A. 200 Joules of energy
 - B. 200 eV of energy
 - C. 200 BTU of energy
 - D. 200 MeV of energy
20. In nuclear reactions, total kinetic energy does not remain conserved in _____ .
 - A. elastic scattering
 - B. inelastic scattering
 - C. radioactive capture
 - D. All of the above

2.24 DPE – A38: Nuclear Medicine and Imaging Technology

1. In occupational dosimetry, the quantity to be compared with the dose limits is:
 - A. Surface dose
 - B. Depth dose
 - C. Organ dose
 - D. Surface and depth doses
2. If entrance doses for two lumbar spine AP projections are 10 mGy (with the same field size) and patient A is examined with 70 kV and patient B with 90 kV:
 - A. Effective doses are the same.
 - B. Effective dose in patient A is greater than patient B.
 - C. Effective dose in patient B is greater than patient A
 - D. Effective doses are not comparable

3. Related to stochastic effects:
 - A. Effect severity increases with dose
 - B. There is a threshold
 - C. Stochastic effects are the same than deterministic effects
 - D. None of the above
4. Biological effect of radiation is NOT modified by:
 - A. Linear energy transfer (LET)
 - B. Moment of the cellular cycle
 - C. Temperature
 - D. None of the above
5. It is FALSE that:
 - A. It is frequent that a malformation occurs during pre-implantation
 - B. Mental retardation occurs mainly between 8 and 25 weeks of pregnancy
 - C. Lethality is more probable to occur during pre-implantation
 - D. None of the above
6. Related to radiation protection (RP):
 - A. RP is not applicable to patients.
 - B. RP is aimed exclusively for workers.
 - C. A doctor can only request a certain number of radiation examinations because of the limitation principle.
 - D. One of the aims of RP is to avoid the deterministic effects of ionizing radiation.
7. Related to the system of radiation protection:
 - A. Justification is not applied in medical exposures.
 - B. Limitation is not applied in medical exposures.
 - C. ALARA criterion aims to give a summary of the contraindicated situations.
 - D. There is also a minimum dose limit that everyone should receive to be healthy.
8. Related to dose limits:
 - A. Public have a higher limit because they do not receive an "extra" dose because of their occupation.
 - B. Skin equivalent dose limit for occupational exposed people is 500 mSv/year
 - C. Dose limits do consider neither the type of occupation nor the country.
 - D. Pregnant woman cannot be exposed to any ionizing radiation, even if it is a medical exposure.
9. Which of the following is in order of increasing wavelength?
 - A. (radio waves) - (visible light) - (X Rays)
 - B. (infra red) - (radio waves) - (X Rays)
 - C. (X Rays) - (visible light) - (ultraviolet)
 - D. (radio waves) - (x rays) - (radio waves)
10. The frequency of a photon of wavelength 6cm is:
 - A. 18 Hz
 - B. 2×10^{-10} Hz
 - C. 5000 Hz
 - D. 5 MHz
11. Which of the following tissues would be classified as radiosensitive?
 - A. Bone marrow
 - B. Brain
 - C. Muscle
 - D. Skin

12. Nuclear Medicine Imaging is a type of _____ imaging.
 - A. Emission
 - B. Transmission
 - C. Artificial
 - D. Projection
13. A feature in radiograph not related to any anatomical structure or physiological process but produced by the measuring process itself is known as:
 - A. Image detail
 - B. Artifact
 - C. Penumbra
 - D. None
14. Which of the following human responses to ionizing radiation would be categorized as a late effect?
 - A. Central nervous system syndrome
 - B. Gastrointestinal syndrome
 - C. Eye damage
 - D. Hematology depression
15. If it is necessary to restrain a patient during a radiographic examination, the most acceptable person to do this is a/an:
 - A. 18-year-old brother of the patient
 - B. 20-year-old female technologist
 - C. 40-year-old male technologist
 - D. 50-year-old female friend of the patient
16. Which of the following is boiled during preparation?
 - A. MAA
 - B. sulfur colloid
 - C. albumin colloid
 - D. di-phosphonates
17. If a radiopharmaceutical is spilled on the floor, the first priority is to:
 - A. Contact the Radiation Safety Officer
 - B. Pour a chelating solution over the area of the spill
 - C. Cover the area with absorbent paper and restrict access around it
 - D. Call the housekeeping department to arrange for cleaning
18. What part of an imaging system emits light when it has absorbed a photon?
 - A. Photomultiplier tube
 - B. Pulse height analyzer
 - C. Scintillation crystal
 - D. Collimator
19. To obtain high-resolution images of a small organ, gland, or joint, which collimator will be most useful?
 - A. Low-energy parallel hole
 - B. Slant hole
 - C. Diverging
 - D. Pinhole
20. What steps should be taken to reduce a star artifact from reconstructed SPECT images?
 - A. Decrease the matrix size
 - B. Increase the time per projection
 - C. Increase the radius of projection
 - D. Increase the number of projections

2.25 DPE – A39: Medical Technology Radiotherapy

1. A structure composed of two or more tissues is termed:
 - A. organ
 - B. serous membrane
 - C. complex tissue
 - D. organ system
2. The visceral pleura:
 - A. is the membrane lining surface of the lungs
 - B. is the membrane lining the wall of the thoracic cavity
 - C. is the fluid around the lungs
 - D. is the thinnest portion of the peritoneum
3. The anatomical position is characterized by all of the following except:
 - A. palms facing posterior
 - B. thumbs pointing laterally
 - C. face pointing anteriorly
 - D. body standing upright
4. Which of the following lies fully ipsilateral to the left iliac region:
 - A. epigastria region
 - B. left hypochondriac region
 - C. right inguinal region
 - D. hypo gastric region
5. The "basic unit of life" is:
 - A. the atom
 - B. water
 - C. the cell
 - D. the chemical level of organization
6. A homeostatic imbalance:
 - A. must be restored by negative feedback mechanisms
 - B. is considered the cause of most diseases
 - C. is when the internal conditions of the body become more stable
 - D. only occur when positive feedback mechanisms are overwhelmed
7. Which of the following is NOT a characteristic of life:
 - A. growth
 - B. responsiveness
 - C. reproduction
 - D. organ systems
8. The sum of all chemical reactions in the body is termed:
 - A. homeostasis
 - B. physiology
 - C. dynamic feedback
 - D. metabolism
9. A vertical plane through the body dividing it into right and left is termed:
 - A. sagittal
 - B. lateral
 - C. transverse
 - D. frontal
10. Which of the following is an example of applied physiology:
 - A. measuring the length of the femur on a fetus using ultrasound
 - B. locating an injury to a tendon in the shoulder using CT imaging
 - C. describing the process of how a toxin interferes with nerve impulse conduction
 - D. identifying the types of cells found in a biopsy sample of lung tissue

11. Which of the following tissues would be classified as radiosensitive?
 - A. Bone marrow
 - B. Brain
 - C. Breast
 - D. Muscle
12. Nuclear Medicine Imaging is type of imaging:
 - A. Emission
 - B. Transmission
 - C. Reflection
 - D. Diffraction
13. Sixth generation CT scanner are also called:
 - A. Linear CT
 - B. Translational CT
 - C. Helical CT
 - D. Rotational CT
14. _____ are widely employed in radiology to enhance the visualization of properties correlated with patient anatomy and physiology.
 - A. Radioactive Drugs
 - B. Saline Water
 - C. Contrast agents
 - D. Aluminum plates
15. A feature in radiograph not related to any anatomical structure or physiological process but produced by the measuring process itself is known as:
 - A. Image detail
 - B. Artifact
 - C. Penumbra
 - D. Blur
16. Which of the following human responses to ionizing radiation would be categorized as late effect?
 - A. Central nervous system syndrome
 - B. Gastrointestinal syndrome
 - C. Eye damage
 - D. Extremity damage
17. Which of the following is correctly stated for diagnostic radiology?
 - A. Collimation is important only for chest examination
 - B. Copper is most often used as an x-ray filter
 - C. Gonad shields are as important for a 50-year-old female as for a 20-year-old female
 - D. Radiographic intensifying screens reduce patient dose
18. When conducting abdominal radiography of a child, which of the following is true?
 - A. Gonad shielding is not necessary
 - B. Increasing kVp will increase contrast
 - C. The parent should hold the child if necessary, and protective apparel should be provided
 - D. The parent should hold the child if necessary, and protective apparel is not necessary
19. Increasing the kilovoltage setting for an exposure will:
 - A. Reduce the skin dose and improve contrast
 - B. Increase skin dose and improve contrast
 - C. reduce skin dose
 - D. increase sharpness

20. Collimators are used to:
- A. Reduce the radiation beam spread
 - B. Filter the radiation beam
 - C. Increase film latitude
 - D. Decrease film latitude

2.26 DPE - A51: Medical Dispenser

1. Which one of following medicine is NOT β -lactam antibiotic?
 - A. Erythromycin
 - B. Cephradin
 - C. Ceftriaxone
 - D. Coamoxiclav
2. Doctor has written "SOS" on his prescription along with some medicine. What does it means?
 - A. Take medicine twice daily
 - B. Take medicine thrice daily
 - C. Take medicine once daily
 - D. Take medicine when needed
3. To prepare 2% mixture of sulphur, you will add how much sulphur in 50 ml of liquid paraffin?
 - A. 02 gram
 - B. 02 milligram
 - C. 01 gram
 - D. 20 gram
4. Insulin can be given in all the routes EXCEPT:
 - A. Intravenous
 - B. Intramuscular
 - C. Subcutaneous
 - D. Intrathecal
5. The brain and the spinal cord form the _____ Nervous system.
 - A. Central
 - B. Peripheral
 - C. Autonomic
 - D. Sympathetic
6. All nerves of the body present outside the brain and spinal cord comprise the _____ nervous system:
 - A. Central
 - B. Peripheral
 - C. Autonomic
 - D. Sympathetic
7. Sympathetic (which are true):
 - A. Ganglia have acetylcholine as a transmitter substance.
 - B. Nerve terminals supplying the heart transmit via adrenaline.
 - C. Nerves supplying skin arterioles transmit via acetylcholine.
 - D. Nerves supplying sweat glands transmit via noradrenalin.
8. The vagus nerve provides the parasympathetic innervations to the (encircle the correct):
 - A. Eye.
 - B. Urinary bladder.
 - C. Small intestine.
 - D. Heart.

9. What is the function of the blood vessels and capillaries?
 - A. They pump blood to the heart
 - B. They filter impurities from the blood.
 - C. They carry blood to all parts of the body.
 - D. They carry messages from the brain to the muscles.
10. Why does blood turn dark red as it circulates through the body?
 - A. It starts to clot.
 - B. It gets old and dirty flowing through the body.
 - C. The oxygen in it is replaced with carbon dioxide.
 - D. The farther blood is from the heart, the more dark red it is.
11. A 50 year old male on warfarin therapy developed significant bleeding after tooth extraction. INR was 20.4. Which of the following would be suitable to treat this acute condition?
 - A. Aminocaproic acid
 - B. Tranexamic acid
 - C. Fresh frozen plasma
 - D. Vitamin K
12. A patient who is taking verapamil for supraventricular tachycardia has become constipated. Which of the following drug is an osmotic laxative that could be used in this patient?
 - A. Aluminium hydroxide
 - B. Diphenoxylate
 - C. Magnesium hydroxide
 - D. Metoclopramide
13. Which of the following vitamins reduces the beneficial effects of levodopa by enhancing its extracerebral metabolism?
 - A. Pyridoxine
 - B. Thiamine
 - C. Tocopherol
 - D. Riboflavin
14. Which of the following has a slow onset but long duration of action and is always used in combination with a corticosteroid by inhalation?
 - A. Aminophylline
 - B. Cromolyn
 - C. Salmeterol
 - D. Epinephrine
15. All of the following are antacids except:
 - A. PPI
 - B. Anti histamines
 - C. Ranitidin
 - D. Lornoxicam
16. The serum analyses conducted for the liver function determination or LFT are:
 - A. T.bilirubin, Urea and Creatinine
 - B. T. bilirubin, SGPT, SGOT and Alkaline Phosphatase
 - C. T.bilirubin, Alkaline phosphatase and cholesterol
 - D. T. bilirubin, SGPT and cholesterol
17. Complete blood counts mainly measure which of the following in the whole blood?
 - A. Hemoglobin, erythrocytes (RBCs), leucocytes (WBCs) and platelets
 - B. mean corpuscular volume and erythrocyte sedimentation rate
 - C. Both A) & B)
 - D. None of the above

18. Which of the following vacuoliner stopper color is not indicated with its proper use?
 - A. Grey for glucose estimation
 - B. Red for chemistry
 - C. Purple for hematology
 - D. Black for coagulation study
19. Which of these are the non-nucleated cells of the blood?
 - A. Lymphocytes
 - B. Erythrocytes
 - C. Neutrophils
 - D. None of the above
20. Which of the following is a hormone?
 - A. Trypsin
 - B. Triiodothyronine
 - C. Amylase
 - D. Lipase

2.27 DPE – A52: Medical Health Physics

1. Which of the following terms describes the body's ability to maintain its normal state?
 - A. Catabolism
 - B. Tolerance
 - C. Homeostasis
 - D. Metabolism
2. Each of the following mature cells has a nucleus EXCEPT:
 - A. Monocyte
 - B. Erythrocyte
 - C. Basophile
 - D. Neutrophil
3. Which of the following is flexible connective tissue that is attached to bones at the joints?
 - A. Adipose
 - B. Cartilage
 - C. Epithelial
 - D. Nerve
4. Each of the following is located in the mediastinum EXCEPT the:
 - A. Aorta
 - B. Heart
 - C. Pancreas
 - D. Trachea
5. Which of the following is located beneath the diaphragm in the right upper quadrant of the abdominal cavity?
 - A. Appendix
 - B. Kidney
 - C. Liver
 - D. Spleen
6. Which of the following cavities are separated by the diaphragm?
 - A. Abdominal and pelvic
 - B. Cranial and spinal
 - C. Pericardial and pleural
 - D. Thoracic and abdominal

7. In which of the following positions does a patient lie face down?
 - A. Dorsal
 - B. Lateral
 - C. Prone
 - D. Supine
8. Which of the following cranial nerves is related to the sense of smell?
 - A. Abducens
 - B. Hypoglossal
 - C. Olfactory
 - D. None of the above
9. Trochlear in the lungs, gas exchange occurs in tiny one-celled air sacs called:
 - A. Alveoli
 - B. Bronchioles
 - C. Capillaries
 - D. Pleurae
10. Each of the following is a segment of the large intestine EXCEPT the:
 - A. Cecum
 - B. Ileum
 - C. sigmoid colon
 - D. transverse colon
11. Which of the following tissues would be classified as radiosensitive?
 - A. Bone marrow
 - B. Brain
 - C. Muscle
 - D. Skin
12. A feature in radiograph not related to any anatomical structure or physiological process but produced by the measuring process itself is known as;
 - A. Image detail
 - B. Artifact
 - C. Penumbra
 - D. None
13. Which of the following human responses to ionizing radiation would be categorized as a late effect?
 - A. Central nervous system syndrome
 - B. Gastrointestinal syndrome
 - C. Eye damage
 - D. Hematology depression
14. Insertion of aluminum, copper and tin filters into the x-ray beam causes;
 - A. Low energy x-rays to be absorbed
 - B. The kVp to increase
 - C. An unnecessary dose on the skin surface
 - D. The dose to increase
15. In a fixed SSD technique, the dose is routinely normalized;
 - A. At the isocenter
 - B. At tumor depth
 - C. At D_{max}
 - D. On the surface
16. In an Iso centric treatment technique, the dose is routinely normalized;
 - A. At the isocenter
 - B. At the tumor depth
 - C. At D_{max}
 - D. On the surface

17. The width of the penumbra increases with;
 - A. Decreased SSD, Decreased source-collimator distance, decreased field size
 - B. Decreased SSD, increased source-collimator distance, increased source size
 - C. Increased SSD, decreased source-collimator distance, increased source size
 - D. Increased SSD, increased source-collimator distance, decreased source size
18. What is the minimum number of counts that should be obtained in a uniformity correction flood for a SPECT camera?
 - A. 10 K
 - B. 10 million
 - C. 30 million
 - D. 60 million
19. Constancy of the dose calibrator must be tested:
 - A. daily
 - B. quarterly
 - C. weekly
 - D. every six months
20. A technologist wishes to evaluate the intrinsic uniformity of a camera used for planar imaging and is preparing a dose of ^{99m}Tc . How much activity is sufficient for the image?
 - A. 2 mCi
 - B. 200 μCi
 - C. 20 mCi
 - D. 10 μCi

2.28 DPE-A53: Mechanical (Manufacturing)

1. What does CAM stand for?
 - A. Computer Aided Milling
 - B. Computer Aided Machining
 - C. Computer Aided Manufacturing
 - D. Computer Aided Mechanic
2. In a CNC program block, N002 G02 G91 X40 Z40..., G02 AND G91 refer to:
 - A. Circular interpolation in counterclockwise direction and incremental dimension
 - B. Circular interpolation in counterclockwise direction and absolute dimension
 - C. Circular interpolation in clockwise direction and incremental dimension
 - D. Circular interpolation in clockwise direction and absolute dimension
3. For generating Coons patch we require:
 - A. A set of grid points on surface
 - B. A set of control points
 - C. Four bounding curves defining surface
 - D. Two bounding curves and a set of grid control points
4. During the execution of a CNC part program block N020 G02 X45.0 Y25.0 R5.0 the type of tool motion will be:
 - A. Circular Interpolation – clockwise
 - B. Circular Interpolation – counterclockwise
 - C. Linear Interpolation
 - D. Rapid feed

5. In an NC machining operation, the tool has to be moved from point (5,4) to point (7,2) along a circular path with center at (5,2). Before starting the operation, the tool is at (5, 4). The correct G and M code for this motion is:
 - A. N010 G03 X7.0 Y2.0 I5.0 J2.0
 - B. N010 G02 X7.0 Y2.0 I5.0 J2.0
 - C. N010 G01 X7.0 Y2.0 I5.0 J2.0
 - D. N010 G00 X7.0 Y2.0 I5.0 J2.0
6. In computer aided drafting practice, an arc is defined by:
 - A. Two end points only
 - B. Center and radius
 - C. Radius and one end point
 - D. Two end points and center
7. On turning lathes the machine zero point is generally at the:
 - A. Head stock of lathe spindle nose face
 - B. Dead center of tail stock
 - C. Tool point mounted on tool post
 - D. None of the above
8. Dwell is defined by:
 - A. G04
 - B. G03
 - C. G02
 - D. G01
9. M30 stands for:
 - A. End of program
 - B. End of block
 - C. End of tape and tape rewind
 - D. Coolant on/ off
10. Typical Electrode material used in EDM:
 - A. Copper
 - B. Tungsten
 - C. Graphite
 - D. All of the above
11. In EDM process, the metal removed is carried out by:
 - A. Melting and vaporization
 - B. Electrolysis
 - C. Fracture of work material due to impact of grains
 - D. None of the above
12. Which of the following processes is used for grinding splined shafts?
 - A. External cylindrical grinding
 - B. Internal cylindrical grinding
 - C. Surface grinding
 - D. Foam grinding
13. Which of the following characteristics of a material is used in forging process?
 - A. Characteristic of elasticity of material
 - B. Characteristic of ductility of material
 - C. Characteristic of plasticity of material
 - D. None of the above

14. Crater wear occurs mainly due to:
 - A. Abrasion
 - B. Diffusion
 - C. Oxidation
 - D. Adhesion
15. Cold working of metal increases:
 - A. Tensile strength
 - B. Hardness
 - C. Yield strength
 - D. All of the above
16. Which of the following is a single point cutting tool:
 - A. Hacksaw Blade
 - B. Milling Cutter
 - C. Grinding Wheel
 - D. Parting tool
17. A connecting rod is made by:
 - A. Casting
 - B. Drawing
 - C. Forging
 - D. Extrusion
18. Which of the following is not a surface finishing process:
 - A. Honing
 - B. Buffing
 - C. Lapping
 - D. Turning
19. Casting replica used to make the cavity is called as:
 - A. Mould
 - B. Pattern
 - C. Cope
 - D. None of the above
20. What is meant by drag in casting process?
 - A. Molten Metal
 - B. Lower part of casting flask
 - C. Upper part of casting flask
 - D. Lower and upper part of casting flask

2.29 DPE- A54: Non-Destructive Testing

1. Which one the following is the major limitation of NDT:
 - A. Equipments are not portable
 - B. Requires high skill and trained workers
 - C. Required so much time to perform the job
 - D. All of the above
2. The plastic deformation of metal takes place when the stress induced in the metal, due to the applied forces, reached the:
 - A. Yield point
 - B. Proportional limit
 - C. Fatigue strength
 - D. Ultimate strength
3. Tensile test can be performed on:
 - A. Impact testing machine
 - B. Universal testing machine
 - C. Rockwell tested
 - D. Brinell tester

4. During hardness test the indenter is usually a:
 - A. Ball
 - B. Pyramid
 - C. Cone
 - D. All of the above
5. Materials which are usually most ductile:
 - A. Face centered cubic lattice
 - B. Body centered cubic lattice
 - C. Hexagonal closed packed lattice
 - D. None of the above
6. The impact test is done to test _____ of a material:
 - A. Strength
 - B. Ductility
 - C. Toughness
 - D. Hardness
7. Which one of the following material will require the largest size of riser for the same size of casting?
 - A. Aluminum
 - B. Cast iron
 - C. Steel
 - D. Copper
8. Liquid penetrant testing is based on the principle of:
 - A. Polarized sound waves in a liquid
 - B. Magnetic domains
 - C. Absorption of X rays
 - D. Capillary action
9. When a small diameter tube is placed in a glass of water, water rises in the tube to a level above the adjacent surface. This is called:
 - A. Viscosity
 - B. Capillary action
 - C. Surface tension
 - D. Barometric testing
10. A penetrant that is self-emulsifying is called:
 - A. Solvent removable
 - B. Water washable
 - C. Post-emulsified
 - D. Dual sensitivity method
11. A lamination in steel plate would be classified as which type of discontinuity?
 - A. Inherent
 - B. Processing
 - C. Service
 - D. None of the above
12. An important consideration when using a direct contact method in magnetic particles testing is:
 - A. Lifting power of the yoke
 - B. Coil diameter
 - C. Preventing arc burns
 - D. Field strength adjacent to the coil inside diameter
13. An advantage of AC equipment over DC is:
 - A. AC is more penetrating
 - B. AC is less hazardous
 - C. AC makes the magnetic particles more mobile on the test surface
 - D. AC equipment is heavier than DC
14. An advantage of a gamma ray source is:
 - A. Radiation may be turned on or off at will
 - B. Outside power is normally not required

- C. Less shielding is required than for X ray
 - D. All of the above
15. Lower X ray tube voltages result in:
 - A. greater wavelengths X rays
 - B. Less penetrating X rays
 - C. Fewer X rays in the primary beam
 - D. All of the above
 16. The eddy current probe is most simply a
 - A. coil of copper wire
 - B. semiconductor
 - C. capacitor
 - D. ceramic resistor
 17. Which of the following transducer materials is the most efficient receiver of ultrasonic energy?
 - A. Lead metaniobate
 - B. Quartz
 - C. Lithium sulphate
 - D. Barium titanate
 18. Which of the following is a true statement?
 - A. Higher frequencies produce lower sensitivity
 - B. Higher frequencies produce longer wavelengths
 - C. Thicker crystals produce lower frequency transducers
 - D. Longer wavelengths produce higher sensitivity
 19. What is the magnetic field strength at the surface of a 25mm diameter bar as compared to that at the surface of a 50mm diameter bar, each carrying 1000 amps of current?
 - A. Twice
 - B. One half
 - C. One quarter
 - D. Four times
 20. Which type of developer would you use to obtain the highest sensitivity test results?
 - A. Dry
 - B. Non-aqueous wet
 - C. Aqueous wet
 - D. Lipophilic

2.30 DPE – A55: Drilling

1. In percussive rock drills (hammer drills), the blow rate of hammer is usually:
 - A. 100-150 per minute
 - B. 200-500 per minute
 - C. 1500-3000 per minute
 - D. None of A, B, C
2. The measure of the distance from the centre line of a cone from the centre of the bit is:
 - A. Journal off set
 - B. Cone of set
 - C. Both A & B
 - D. None of A, B, C
3. The overall cost of drilling per meterage is comparatively much higher in case of:
 - A. Surface set diamond bit
 - B. Impregnated diamond bit
 - C. Both A & B
 - D. None of A, B, C

4. The ability of maintaining a constant penetration rate in similar formation is more in:
 - A. Surface set diamond bit
 - B. Impregnated diamond bit
 - C. Both A & B
 - D. None of A,B,C
5. What kind of rotary roller bits are good for soft rocks:
 - A. Long teeth, wide spaced
 - B. Small teeth, closely spaced
 - C. Both A & B
 - D. None of A,B,C
6. Which of these is used in bit making?
 - A. Tungsten carbonates
 - B. Tungsten chromite
 - C. Tungsten calcite
 - D. Tungsten carbide
7. In cross bits (star bits) the chisel shaped segments are usually at:
 - A. Angles of 45 deg with each other
 - B. Angles of 60deg with each other.
 - C. Almost right angles
 - D. Angles of 120 deg with each other.
8. Usually button bits have a size range from:
 - A. 14 mm to 67 mm
 - B. 19 mm to 460 mm
 - C. 557 mm to 814 mm
 - D. 821 mm to 913 mm
9. For very soft formation pump pressure should be:
 - A. High
 - B. Low
 - C. Optimal
 - D. Very low
10. Halite is the name of:
 - A. White Cement
 - B. Iron ore
 - C. Common Salt
 - D. A clay
11. NGR stands for:
 - A. National Geologic Reference
 - B. National Grid Reference
 - C. National Geographic Reference
 - D. National Group Reference
12. Potwar Plateau is bounded to the east by
 - A. Jhelum River
 - B. Indus River
 - C. Chenab River
 - D. Ravi River
13. Himalayas are the product of collision between:
 - A. Arabian plate and Afghan Block
 - B. Indian plate Euro-Asian plate
 - C. African plate Euro-Asian plate
 - D. Antarctic plate and North American plate
14. Contour is a:
 - A. Line showing points of different heights
 - B. Line showing points of same heights
 - C. Indicates hill tops
 - D. Indicates a deep basin

15. Sandstone is formed by:
 - A. volcanic activity
 - B. igneous activity
 - C. sedimentation
 - D. metamorphism
16. In percussion drilling:
 - A. Drill bit is used
 - B. Heavy bailer is used
 - C. Wireline system is used
 - D. Rotary machine is used
17. Which one of the following is the oldest type of drilling?
 - A. Rotatory drilling
 - B. Percussion drilling
 - C. Calyx drilling
 - D. Auger drilling
18. The ability of rock to allow liquids to enter is called:
 - A. Aeration
 - B. Permeability
 - C. Capillarity
 - D. Hydraulic conductivity
19. The soil which cracks and shrinks most as it dries is:
 - A. Chalky soil
 - B. Clayey soil
 - C. Loaray soil
 - D. always rich in mineral content
20. why line drilling is a methodology in which:
 - A. core is recovered by pulling rods
 - B. core is not recovered
 - C. core is recovered without cooling rods
 - D. whole is reamed by using a bit

2.31 DPE-A56: Woodwork Technology

1. Sapwood consists of _____.
 - A. Innermost annular rings around the pith
 - B. Portion of timber between heartwood and cambium layer
 - C. Thin layers below ht bark
 - D. Thin fiber which extends from the pith outwards and holds the annular rings together
2. Which of the following trees yields hardwood?
 - A. deodar
 - B. chir
 - C. shishum
 - D. pine
3. Which of the following timber is suitable for making sports goods?
 - A. mulbery
 - B. mahogany
 - C. sal
 - D. deodar
4. the disease of dry rot in timber is caused by:
 - A. lack of ventilation
 - B. alternate wet and dry conditions
 - C. same tensile strength in all directions
 - D. none of the above

5. Plywood has the advantage of:
 - A. High tensile strength in longitudinal direction
 - B. High tensile strength in transverse direction
 - C. Same tensile strength in all directions
 - D. None of the above
6. The moisture content in a well seasoned timber is _____.
 - A. 4 to 6%
 - B. 10 to 12%
 - C. 15 to 20%
 - D. None of the above
7. The tree trunk when all the branches have been cut, is named as:
 - A. log
 - B. batten
 - C. plank
 - D. All of the above
8. Which of the following is not a hard wood?
 - A. fir
 - B. cherry
 - C. walnut
 - D. maple
9. When finished with spraying, _____ should be wore.
 - A. Rubber gloves
 - B. Mask or respirator
 - C. An apron
 - D. All of the above
10. A shallow dent in wood can sometimes be repaired by _____.
 - A. Swelling the wood by steam
 - B. Filling it with glue
 - C. Filling it with silver of wood
 - D. Rubbing it with white shellac
11. To cut a groove for a strip of inlay, _____ bit is used.
 - A. beading
 - B. V-grooving
 - C. Left-hand spiral
 - D. Core box
12. Large machines with two belts arranged on three pulleys are capable of _____ speed settings.
 - A. three
 - B. six
 - C. nine
 - D. twelve
13. when making straight cuts,:
 - A. choose the widest blade possible
 - B. use a special V-fixture
 - C. make a sandwich of the material
 - D. All of the above
14. Cutting several pieces at one time is called _____ sawing.
 - A. pad
 - B. repeat
 - C. duplicate
 - D. pattern
15. The elevating crank is used to adjust:
 - A. Cutting width
 - B. Depth of cut
 - C. Angle of cut
 - D. All of the above

16. The most common saw blades are _____.
- A. Ripsaw blades
 - B. Combination blades
 - C. Crosscut blades
 - D. None of the above
17. Flat cutting produces a _____ grain.
- A. flat
 - B. patterned
 - C. irregular
 - D. cathedral
18. A screw-mate drill and countersink can be used with _____.
- A. Swelling the wood by steam
 - B. Filling it with glue
 - C. Filling it with silver or wood
 - D. Rubbing it with white shellac
19. A device for holding a door closed is called _____.
- A. knob
 - B. T-plate
 - C. pull
 - D. catch
20. Hand tools used to cut a mortise include a drill and a _____.
- A. Fine crosscut saw
 - B. Dovetail saw
 - C. Table saw
 - D. ripsaw

3.0 Sample Question Sheet

PAKISTAN ATOMIC ENERGY COMMISSION

Departmental Promotion Examination

Employee Name: _____	Signature: _____
Establishment Name: _____	
PIN: _____	Paper Code: _____

TIME ALLOWED: Three (03) Hour

Please read the following instructions carefully before attempting the question paper.

1. Please check that the question paper given to you **contains 100 questions.**
2. **Please check that a one-page printed answer sheet has been provided to you.**
3. **Do not bend, roll or fold the printed answer sheet.**
4. You must write your **name and put your signature** in the spaces provided on this page and also on the answer sheet.
5. You may do your rough work anywhere on the question paper. **Do not use the answer sheet for any rough work.**
6. Put your pens down as soon as you hear **“stop writing”**, otherwise your paper may be cancelled.
7. **After the test is over, place your printed answer sheet inside the question paper and return both the question paper and answer sheet to the invigilator.**
8. **Mobile phones/tablets are strictly prohibited in the examination hall.**
9. **Programmable calculators are not allowed.**
10. Anyone found using unfair means will be disqualified right away.
11. All questions carry negative marks so be careful when attempting a question.
12. Cooperate with invigilators.
13. For any question, raise your hand only.

Result will be declared by PAEC HQ, so for any query don't disturb the invigilators.

4.0 Sample Answer Sheet



PAKISTAN ATOMIC ENERGY COMMISSION DPE-2015 - Answer Sheet

Employee Signature _____	Invigilator's Signature _____
Employee Name: _____	
Establishment Name: _____	
PIN: _____ Paper Code: _____	

PLEASE ENCIRCLE THE APPROPRIATE ANSWER.

No.	Answer				No.	Answer				No.	Answer				No.	Answer	
1	A	B	C	D	26	A	B	C	D	51	A	B	C	D	76	T	F
2	A	B	C	D	27	A	B	C	D	52	A	B	C	D	77	T	F
3	A	B	C	D	28	A	B	C	D	53	A	B	C	D	78	T	F
4	A	B	C	D	29	A	B	C	D	54	A	B	C	D	79	T	F
5	A	B	C	D	30	A	B	C	D	55	A	B	C	D	80	T	F
6	A	B	C	D	31	A	B	C	D	56	A	B	C	D	81	T	F
7	A	B	C	D	32	A	B	C	D	57	A	B	C	D	82	T	F
8	A	B	C	D	33	A	B	C	D	58	A	B	C	D	83	T	F
9	A	B	C	D	34	A	B	C	D	59	A	B	C	D	84	T	F
10	A	B	C	D	35	A	B	C	D	60	A	B	C	D	85	T	F
11	A	B	C	D	36	A	B	C	D	61	A	B	C	D	86	T	F
12	A	B	C	D	37	A	B	C	D	62	A	B	C	D	87	T	F
13	A	B	C	D	38	A	B	C	D	63	A	B	C	D	88	T	F
14	A	B	C	D	39	A	B	C	D	64	A	B	C	D	89	T	F
15	A	B	C	D	40	A	B	C	D	65	A	B	C	D	90	T	F
16	A	B	C	D	41	A	B	C	D	66	A	B	C	D	91	T	F
17	A	B	C	D	42	A	B	C	D	67	A	B	C	D	92	T	F
18	A	B	C	D	43	A	B	C	D	68	A	B	C	D	93	T	F
19	A	B	C	D	44	A	B	C	D	69	A	B	C	D	94	T	F
20	A	B	C	D	45	A	B	C	D	70	A	B	C	D	95	T	F
21	A	B	C	D	46	A	B	C	D	71	A	B	C	D	96	T	F
22	A	B	C	D	47	A	B	C	D	72	A	B	C	D	97	T	F
23	A	B	C	D	48	A	B	C	D	73	A	B	C	D	98	T	F
24	A	B	C	D	49	A	B	C	D	74	A	B	C	D	99	T	F
25	A	B	C	D	50	A	B	C	D	75	A	B	C	D	100	T	F

FOR EXAMINER'S USE ONLY:

Questions	Attempted	Correct	Incorrect	Marks Obtained	Total Marks	Checked By
01-75						
76-100						

