M.Tech CET Sample Paper

ENGLISH

1. Which of the phrase given below should replace the phrase printed in underlined to make the sentence grammatically correct?

He found the gold coin **as he cleans** the floor.

a) as he had cleaned
b) while he cleans
c) which he is cleaning
d) while cleaning
e) No correction required

2. Which of the phrases given below should replace the phrase printed in underlined to make the sentence grammatically correct?

She cooks, washes dishes, does her homework and **then relaxing**.

a) relaxing then
b) then is relaxing
c) relaxing is then
d) then relaxes
e) No correction required

3. Which of the phrases given below should replace the phrase printed in underlined to make the sentence grammatically correct?

Technology **must use to feed** the forces of change.

a) must be used to feed
b) must have been using to feed
c) must use having fed
d) must be using to feed
e) No correction required

4. Which of the phrases given below should replace the phrase printed in underlined to make the sentence grammatically correct?

They **are not beware of** all the facts.

a) are not aware for
b) are not aware of
c) must not to be aware for
d) are not to be aware
e) No correction required

5. I will go _____ vacation next month.

a) in b) for c) of d) on

6. They _____ on the project at the moment.

a) are working b) be working c) working d) is working

7. Do you still _____ to the tennis club?.

a) belonging b) belong c) belongs d) are belong

8. I never _____Tim anymore.

a) seen b) see c) seeing d) has see

9. I _____ football after work.

a) playing b) to play c) play d) am play

10. Alan is a fan _____ Manchester United.

a) in b) for c) of d) on

11. I don't know his reason _____ ending the relationship.

a) in b) for c) of d) on

12. My brother does not eat _____ chicken.

a) a b) an c) the d) no article

13. Sara can play _____ guitar.

a) a b) an c) the d) no article

14. John travelled to _____ Mexico.

a) a b) an c) the d) no article

15. That is _____ problem I told you about.

a) a b) an c) the d) no article

16. The pilot was _____ injured, he died within half an hour.

A. seriously
B. fatally
C. fatefully
D. vitally

17. The punch made the boxer _____ in pain.

A. wince
B. gape
C. grumble
D. fumble

18. Since one cannot read every book, one should be content with making a _____ selection.

A. normal
B. standard
C. moderate
D. judicious

19. Satish was _____ with a natural talent for music.

A. given
B. found
C. endowed
D. entrusted

20. If greater security measures had been taken, the tragedy might have been _____.

A. removed
B. repeated
C. restrained
D. averted

Mathematics

1. If A be a 3 x 3 matrix with Eigen values 1,-1,0 then the determinant of $I+A^{100}$ is [ ]
   (a) 6 (b) 4 (c) 9 (d) 100

2. If the lines $\frac{x-1}{-1} = \frac{y-3}{k} = \frac{z+1}{5}$ and $\frac{x+1}{-4} = \frac{y+1}{3} = \frac{z}{-k}$ are perpendicular, the value of k is [ ]
   (a) 2 (b) -2 (c) 4 (d) 3

3. The radius of curvature for the curve $y=e^x$ at (0,1) is [ ]
   (a) $\sqrt{2}$ (b) $2\sqrt{2}$ (c) $\frac{1}{\sqrt{2}}$ (d) $\frac{1}{2\sqrt{2}}$

4. The Quadratic equation in x whose roots are -2,5 is [ ]
   (a) x^2-3x-10=0 (b) x^2+7x+10=0 (c) x^2+3x-10=0 (d) x^2-7x-10=0

5. A triangle has sides a=9.0 cm ,b=8.0 cm and c=6.0 cm .Angle A is equal to [ ]
   (a) 82.42^0 (b) 56.49^0 (c)78.58^0 (d)79.87^0

6. A water tank is in the shape of a rectangular prism having length 1.5 m, breadth 60 cm and height 300mm.If 1 litre=1000cm^3,the capacity of the tank is [ ]
   (a) 27 litres (b)2.7 litres (c) 2700 litres (d) 270 litres

7. The equation of a circle is $x^2+y^2-2x+4y-4=0$ which of the following statements is correct [ ]

   (a) The circle has centre (1,-2) and radius 4
   (b) The circle has centre (-1,2) and radius 2
   (c) The circle has centre (-1,-2) and radius 4
   (d) The circle has centre (1,-2) and radius 3

8. The first term of a geometric progression is 9 and the fourth term is 45.The eighth term is [ ]
   (a) 225 (b) 150.5 (c) 384.7 (d) 657.9

9. The mean value of a sine wave over half a cycle is [ ]
   (a) 0.318 x maximum value (b) 0.707 x maximum value
   (c) peak value (d) 0.637 x maximum value

10. $\int \ln x \, dx$ is equal to [ ]
    (a) x(lnx-1)+c (b) $\frac{1}{x}$ +c (c)x lnx-1 +c (d)$\frac{1}{x} + \frac{1}{x^2}$ +c

11. Regula Falsi method is used for [ ]
    (a) Solution of ordinary differential equation
    (b) Differential of a function
    (c) Integration of a function
    (d) Solution off an algebraic (or) transcendental equation

12. If f(x)= 2x is represented by fourier series in $(-\pi, \pi)$ then the value of a_0= [ ]
    (a) 0 (b)π (c)$\frac{\pi}{2}$ (d)2π

13. $\int_0^{\infty} \frac{\sin ax}{x}\, dx, (a > 0) =$ [ ]
    (a) π (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi a}{2}$

14. The general solution of px+qy=z is [ ]
    (a) F($\frac{x}{z}$,$\frac{y}{z}$)=0 (b) F(x,y)=0 (c) F(x-z,y-z)=0 (d) F(x,y,z)=0

15. $\frac{\beta(m+1,n)}{\beta(m,n)}$ = [ ]
    (a) $\frac{n}{m+n}$ (b) $\frac{m+n}{m}$ (c) $\frac{m}{m+n}$ (d) $\frac{m+n}{n}$

16. $\int_{-1}^{1} p_m(x) p_n(x) dx$ (m$\neq n$) [ ]
    (a) $\frac{2}{2n+1}$ (b) 0 (c) $\frac{2}{2m+n}$ (d) $\frac{2}{m+n}$

17. Singularity is a point where f(z) is not [ ]
    (a) Defined (b) having the limit (c)continuous (d)differentiable

18. The order of the pole of $\frac{(e^x-1)}{z^4}$ is [ ]
    (a) 3 (b) 1 (c) 2 (d) 4

19. If C is unit circle |z|=1 then $\int_c \bar{z}\, dz$ = [ ]
    (a) 0 (b) 1 (c) $2\pi i$ (d) 4 πi

20. If the product of the eigen values of A is positive then A is a _____ matrix [ ]
    (a) Non-Singular (b) Singular (c) Symmetric (d) Skew-Symmetric

MTech CET - Marine Engineering Sample Paper

1. The main reason counterweights are added to crankshafts is to
   A) reduce piston side thrust
   B) reduce crankshaft end thrust
   C) provide uniform loading and wear of main bearings
   D) increase the strength of the crank webs

2. An advantage of aluminium pistons compared to cast iron pistons is:
   A) greater high temperature strength
   B) better heat conductivity
   C) greater weight per cubic cm
   D) increased resistance to wear

3. Which is found with both mechanical and hydraulic governors?
   A) direct linkage between the ball head and fuel rack
   B) a servomotor
   C) a compensating device
   D) flyweights

4. Theoretical perfect combustion in a diesel engine yields by-products of
   A) aldehydes and carbon dioxide
   B) water vapour and carbon monoxide
   C) nitrogen and carbon monoxide
   D) water vapour and carbon dioxide

5. Which of the bearings listed are most widely used for the main and connected rod bearings of a diesel engine?
   A) roller
   B) sleeve
   C) precision insert
   D) needle

6. Friction, engine wear, and oil consumption in a diesel engine are directly related to the
   A) acidity of the oil
   B) pour point of the oil
   C) flash point of the oil
   D) viscosity of the oil

7. An individual injection pump is designed for variable beginning and constant ending of injection. For diesel engines operating at constant speeds, the start of injection will
   A) advance as the load increases
   B) retard as the load increases
   C) remain unchanged regardless of load
   D) always occur at top dead center

8. Fuel oil penetration into the cylinder of a diesel engine is

   A) dependent on air turbulence
   B) reduced by finer atomization
   C) increased by finer atomization
   D) non-existent in the pre-combustion chamber system

9. Which of the following will cause cavitation
   A) Low discharge pressure
   B) Throttling the suction valve
   C) Low water level in the wet well
   D) High discharge pressure

10. The static suction head of a pump is the
   A) A.distance of the suction liquid level above the center line of the pump
   B) B.distance the suction liquid level is below the center line of the pump
   C) C.force necessary to overcome frictional losses in the pump and piping.
   D) D.amount in inches of mercury the total suction head is below atmospheric pressure

11. Which of the following is the material used for manufacturing tube plates of a shell and tube type heat exchanger?
    A) Cupro-nickel
    B) Aluminum Brass
    C) Admiralty Brass
    D) Gunmetal

12. Which of the listed conditions can lead to cavitation in a centrifugal pump?
    A) Vapor pockets formed in the suction flow stream
    B) Rough casing volute surfaces
    C) Worn wearing rings
    D) Heavy fluid in the flow stream

13. If water contamination occurs in the crankcase oil of an auxiliary engine the oil viscosity will:-
    A) Increase.
    B) Nothing happens
    C) Stay at the same.
    D) Decrease.

14. Too high Calculated Carbon Aromaticity Index (CCAI) of fuel oil indicates:
    A) Reduced ignition delay
    B) Increased ignition delay
    C) Reduced chances of knocking
    D) None

15. The seating material for perfectly sealing type Ball valves is usually made up of
    A) Rubber
    B) PTFE or Nylon
    C) Rubber reinforced with steel wire
    D) Stainless steel

16. Kinetic energy is converted into pressure energy in a turbocharger compressor by

A) Combined diffuser and nozzle ring
B) Nozzle ring only
C) Combined diffuser and volute casing
D) Volute casing only

17. What long term effect will excessively high temperature have on lubricating oil quality?

A) Cause oxidation which reduce viscosity.
B) Evaporates the oil giving high consumption.
C) The oil flashpoint will be changed.
D) Cause oxidation which increase viscosity.

18. Personnel working with refrigeration systems, and subject to the exposure of refrigerants should wear

A) face shield
B) a respirator
C) rubber gloves
D) an all-purpose gas mask

19. Electrical fire extinguished by

A) CO_2
B) DCP
C) FOAM
D) Water

20. Fuel oil tank vents are fitted with a screen which will stop _____.

A) oil from flowing out of the tank vent
B) air from entering the tank vent
C) vapors from leaving the tank vent
D) flames on deck from entering the tank vent

21. Labyrinth seal fitted on the back surface of a compressor wheel of a turbocharger:

A) Prevents bearing lube oil contamination
B) Prevents bearing lube oil being sucked into the air stream
C) Helps to keep the shaft cool by controlled leakage of air
D) None of the above

22. What is meant by elasto hydrodynamic lubrication?

A) Formation of hydrodynamic film under high pressure with minor elastic deformation of mating
B) surfaces, distributing load over a greater area
C) Addition of extreme pressure additive (EP) to the lubricant
D) Addition of Viscosity index improvement additive

23. Inert Gas System on board tankers is used during which of the following operations____

A) Inerting of empty tanks
B) Inerting during crude oil washing
C) Purging before gas freeing
D) All of the above

24. Panting is caused by
A) Change in the height of waves
B) Loss of buoyancy of forward part of ship
C) Vessel in shallow depth channel
D) None of these

25. Double entry impellers have a distinct advantage over single entry impeller. What is it?

A) They balance out the axial thrust
B) It gives a higher pumping efficiency
C) It is cheaper and easier to manufacture
D) The need of installing line bearing onto the pump shaft is eliminated

26. If the boiler tubes are scaled on the water side then
    A) Heat conduction through the tubes will be very high leading to rapid evaporation
    B) The boiler furnace can get damaged due to excessive temperatures
    C) The surface of the tube will be overheated as heat transfer is impaired
    D) The natural circulation of water within the boiler will be more efficient

27. Fins are installed on the generating tube surfaces in waste heat boilers to
    A) Prevent soot fires in the exhaust system
    B) Prevent exhaust gas erosion of the tubes
    C) Increase the velocity of exhaust gas flow
    D) Increase the rate of heat transfer

28. Fusible plugs are installed in fire-tube boilers to
    A) provide a means of draining the boiler
    B) warn the engineer of low water level
    C) cool the crown sheet at high firing rates
    D) open the burners' electrical firing circuits

29. The purpose of economizer is to:
    A) Decrease the capacity and size of the auxiliary boiler
    B) Cooling down the exhaust gases in order to reduce NOx emission
    C) Allowing Sox to react at low temperatures with water to form acids thus reducing Sox emission
    D) Increasing the overall efficiency of the main propulsion plant

30. The purpose of an air cooler in a supercharging system is to:
    A) Reduce temperature of supercharged air in order to condense and remove maximum possible moisture from the air prior entry to the engine
    B) Reduce the temperature of the supercharged air in order to increase the density & also to cool down below dew point to remove moisture from air prior entry to the engine
    C) Cool supercharged air to increase its density such that the dew point is not reached to avoid entry of moisture into the engine
    D) Cool supercharged air to increase its density and also to keep the peak temperature and exhaust gas temperature within limits

31. What is the meaning of the term "Valve clearance"?

A) The clearance between the rocker arm and valve pushrod.

B) The clearance between valve spindle disc and seat.

C) The clearance between the rocker arm and camshaft pushrod.

D) The clearance between the rocker arm and valve pushrod in either warm or cold state.

32. The centre of buoyancy of vessel is shifted when

A) Underwater shape of the hull changes

B) Vessel's draft is changed

C) Vessel moves from fresh water to sea water

D) All of these

33. Why is it essential to renew turbocharger bearings after a preset number of hours of running even if the bearings are in seemingly perfect condition?

A) Because they are prone to failure due to prolonged exposure to high temperature conditions.

B) Because they are subject to cyclic loading and are prone to failure due to metal fatigue.

C) It is not essential to renew if condition monitoring suggests perfect condition.

D) Lube oil contamination is bound to occur and affect the condition of the bearings.

34. The over speeding of the diesel engine driving an electric generator could cause

A) low voltage trip to trip

B) reverse power trip to trip

C) damage to windings

D) excessive exhaust temperatures

35. Water carryover from boiler onboard through the steam causes

A) Erosion of the steam plant machinery

B) Low water level inside the boiler

C) Build-up of deposits on the steam plant machinery

D) None of the above

36. Short cycling of a fridge compressor can occur in which of the following cases?

A) Air ingress into the system

B) B.A leaking solenoid valve

C) High cooling water temperature going to the condenser

D) Excessive refrigerant charge

37. Why steel components electroplated with chromium are used in corrosive environment

A) Chorme Plating Prevents Corrosion
B) Protection to the steel will be preferentially corroded
C) Zinc plating Is Used On Top Of Chrome Plating For Corrosion Protection
D) Thickness of chrome plating to increase

38. Steel is an alloy of iron carbon and alloying components what is the carbon content?

A) Less than 1 %
B) Less than 2%
C) Greater than 2%
D) Any % of carbon

39. Air pipes in tanks are generally located:

A) A.Near filling pipes
B) B.Near pump suctions
C) C.At the opposite end of filling pipes and/or the highest point in the tank
D) D.At the lowest point in the tank

40. The surface of each blade of propeller when viewed from aft is known as the _____

A) A.Back
B) B.Leading edge
C) C.Trailing edge
D) D.Face

41. The cyclic angular motion of a ship about the ford and aft axis under the action of waves is known as:

A) Pitching
B) Yawing
C) Rolling
D) Heaving

42. Curves of immersed cross-sectional area of a ship , plotted against draught for each transverse section, are known as

A) Cross curves of Stability
B) Displacement Curves
C) Hydrostatic Curves
D) Bonjean Curves

43. Peak tanks are tested by:

A) Hose test
B) By filling them with water up to load water line
C) By filling them with water up to the maximum head which can come on them in practice or 2.44 m above tank crown, whichever is higher
D) None of the above

44. Plates used to connect stern frames to flat plate keel are called:

A) Shoe plates
B) Coffin plates
C) Stealer plates
D) Boss plates

45. Thickness of strakes of bottom plating is increased in which of the following regions of the ship?

A) Pounding region
B) Over 40% of ships length amidships
C) Over 40% of ships length forward
D) Both A and B

46. In a shell expansion plan, plate D5 refers to:

A) Fourth plate from aft and fifth strake from keel
B) Fifth plate from aft and fourth strake from the keel
C) Fourth plate from forward and fifth strake from keel
D) Fifth plate from forward and fourth strake from keel

47. The mass of a ship without cargo, fuel, stores, water, crew etc that a ship carries is known as:
    A) Deadweight
    B) Lightweight
    C) Displacement
    D) Tonnage

48. The frictional resistance increases when the draft increases because
    A) Dead weight of the vessel increases.
    B) Length of water plane increases.
    C) Wetted surface increases.
    D) Temperature of water reduces as draft increases.

49. As per conditions of assignments, the minimum height of air pipe openings must be _____ on the freeboard deck
    A) 380 mm
    B) 450 mm
    C) 600 mm
    D) 760 mm

50. The primary purpose of fitting a bulbous bow is to:
    A) Improve the appearance of the ship.
    B) Strengthen the bow
    C) Improve propulsive efficiency
    D) Improve resistance to pounding

51. The purpose of providing tumble home is to:
    A) Improve the appearance of the ship
    B) Help drain off water from deck easily
    C) Reduce the volume of water coming on deck
    D) Help drain tanks to bilges

52. GM of ship will change with
    A) Shifting of weight longitudinally
    B) Shifting of weight transversely
    C) Shifting of weight vertically
    D) All of the above

53. In longitudinally framed double bottoms, in frame spaces where there are no solid floors, the brackets on tank sides and center girder should not be more than _____ apart.

A) 2.5m
B) 3.7m
C) 3.8m
D) 1.25m

54. In longitudinally framed double bottoms, solid plate floors are fitted at _____ frame space in pounding region and at _____frame space under the main engine.

A) Alternate, every
B) Alternate, alternate
C) Every, every
D) Every, alternate

55. 'kg' of ship increases with...

A) adding weight above on present kg
B) balasting db tank
C) moving weight in transverse direction
D) moving weight in frwd direction

56. In ship beam bracket are triangular plates joining the deck beam to a.

A) Bulkhead
B) Frame
C) Stanchion
D) Deck longitudinal

57. The bleeder plug or docking plug located on a motor vessel double bottom tank is used to

A) indicate when the tank is pressed up
B) provide a secondary means of tank sounding
C) vent air from the tank when bunkering.
D) empty the tank when in dry dock

58. Vertical support member used to strengthen bulkheads are called

A) stiffner
B) panels
C) brackets
D) stanchions

59. Definition of permeability is

A) Volume of empty space above cargo divided by total volume
B) Volume of loaded space divided by total volume
C) Volume of empty space within cargo divided by total volume
D) Volume of empty space below waterline divided by total volume

60. When reading electrical motor controller diagrams, it helps to know that _____.

A) current paths in the control circuit are drawn as heavy lines and in the power circuit as lighter lines
B) current paths in the power circuit are drawn as heavy lines and in control circuit as lighter lines
C) circuits subject to 500 volts or greater are drawn as heavy lines and below 500 volts as lighter lines
D) circuits subject to 500 volts or greater are drawn as light lines and below 500 volts as heavy

61. The inductance of a coil is expressed in _____.

A) ohms
B) mhos
C) Henrys
D) farads

62. Large cable sizes are formed as individual conductors that may be comprised of several smaller strands to _____.

A) obtain the flexibility required for easy handling
B) reduce the overall weight of the wire run
C) reduce the number of supports needed for a horizontal overhead run
D) all of the above

63. Which of the following is having Di-Electric Constant 80?

A) Air
B) water
C) Mica
D) Castor oil

64. Brushless generators are designed to operate without the use of

A) Brushes
B) Slip rings
C) Commutators
D) All the above

65. A fuse that blows often should be replaced only with a fuse of

A) the recommended current and voltage rating
B) higher current and voltage rating
C) higher current and lower voltage rating
D) lower current and higher voltage rating

66. Refrigerant compressor will run continuously

A) Too heavy cooling load
B) Air in the system
C) Insufficient refrigerant
D) Any of the above

67. The coating on an electrode used for electric arc welding _____

A) creates a gas shield to prevent oxidation of the weld material
B) helps the weld formation by shaping the metal transfer
C) provides an electrical insulation for the user
D) All of the above

68. As per definition of MARPOL Annex-I, a product tanker is one which can carry:

A) Oils and chemicals
B) Oils other than crude oils
C) Oil product and occasionally crude oils
D) Mainly chemical products but at times refined oil products

69. EEDI is the Technical measure adopted by IMO to reduce ___.

A) Greenhouse gas.

B) SOx

C) NOx

D) None of the above

70. If there is a dispute with the bunker supplier with respect to fuel quantity or quality which of the following document is issued

A) BDN
B) MSDS
C) Letter of protest
D) All of the above

71. If the chemical analysis of a lube oil sample taken from the main propulsion machinery indicates an increased neutralization number the _____.

A) acidity has increased
B) viscosity has decreased
C) demulsibility has improved
D) foaming is guaranteed to occur

72. Diameter of emergency bilge suction pipe is

A) Smaller than that of ballast pump
B) larger than that of main Sea water pump
C) equal to the suction pipe of the pump to which it is connected
D) None of the above

73. Turbocharger performance is measured by

A) It's RPM with respect to the engine load
B) The temperature drop across the inlet & outlet of turbine
C) The scavenge air pressure developed at the scavenge manifold
D) All of the above

74. In still water the ship experiences longitudinal bending moments due to

A) Non uniorm distribution of weight
B) Non uniorm distribution of buoyancy
C) Non uniorm distribution of load
D) All of these

75. The region where the sheer strake meets the deck plate is known as the
A) bilge
B) gunwale
C) stringer
D) transom

76. Purpose of bilge keel is to render
A) longitudinal strength to the ship
B) active roll stabilisation
C) passive roll stabilisation
D) All of these

77. Why is it important for fuel oil tanks not to be topped off when loading cold oil?
A) Increased viscosity of the product needs higher loading pressure, which increases the chance of a spill
B) Air lock may cause the fuel to buble out
C) The change in specific volume when heated may cause overflow
D) The fuelling valve may get stuck closed and may spill fuel oil when opened

78. BLEVE is
A) Boiling liquid energising vapour exclusion
B) Boil-off liquid expanding variable efficiency
C) Boiling liquid expansion and vapourising efficiency
D) Boiling liquid expanding vapour explosion

79. Tankers are provided with smaller freeboard
A) Cargo density below sea water
B) Weight of loaded cargo is less than local buoyancy force
C) Water tightness of tanker more rigid
D) All of these

80. The pressure produced within the oil wedge of a rotating journal is_____.
A) the same as the pressure in the lubricating system
B) less than the pressure in the lubricating system
C) greater than the pressure in the lubricating system
D) highest at the oil groove location

MTECH CET SAMPLE PAPER

MECHANICAL ENGINEERING

1. Metal patterns are used for
   a. Small castings
   b. Large casting
   c. Complicated casting
   d. Large scale production of castings

2. Vehicle manufacturing assembly line is an
   a. Product layout
   b. Process layout
   c. Manual layout
   d. Fixed layout

3. In arc welding, the electric arc is produced between the work and the electrode by
   a. Voltage
   b. Flow of current
   c. Contact resistance
   d. All of these

4. Work done is said to be zero, when
   a. Same force acts on a body, but displacement is zero
   b. No force acts on a body but some displacement takes place
   c. Either (a) or (b)
   d. None of the above

5. The equation of motion for a spring-mass system excited by a harmonic force is

$$M\ddot{x} + kx = F\cos(\omega t)$$

   Where M is the mass, k is the spring stiffness, F is the force amplitude and ω is the frequency of excitation. Resonance occurs when ω is equal to.

   a. $\sqrt{M/k}$
   b. $\frac{1}{2\pi}\sqrt{k/M}$
   c. $2\pi\sqrt{k/M}$
   d. $\sqrt{k/M}$

6. If σ_1 and σ_3 are the algebraically largest and smallest principal stresses respectively, the value of the maximum shear stress is
   a. $\frac{(\sigma 1+ \sigma 3)}{2}$
   b. $\frac{(\sigma 1- \sigma 3)}{2}$
   c. $\sqrt{(\sigma 1 + \sigma 3)/2}$
   d. $\sqrt{(\sigma 1 - \sigma 3)/2}$

7. Which one of the following statement is correct for a superheated vapor
   a. Its pressure is less than the saturation pressure at a given temperature
   b. Its temperature is less than the saturation temperature at a given pressure
   c. Its volume is less than the volume of the saturated vapor at a given temperature
   d. Its enthalpy is less than the enthalpy of the saturated vapor at a given pressure

8. Pre-tensioning of a bolted joint us used to
   a. Strain harden the bolt head
   b. Decrease stiffness of the bolted joint
   c. Increase stiffness of the bolted joint
   d. Prevent yielding of the thread root

9. Metal removal in electric discharge machining takes place through
   a. Ion displacement
   b. Melting and vaporization
   c. Corrosive reaction
   d. Plastic shear

10. The preferred option for holding an odd-shaped work piece in a center lathe is
    a. Live and dead centers
    b. Three jaw chuck
    c. Lathe dog
    d. Four jaw chuck

11. Which one of the following is NOT a rotating machine
    a. Centrifugal pump
    b. Gear pump
    c. Jet pump
    d. Vane pump

12. The Poisson's ratio for a perfectly incompressible linear elastic material is
    a. 1
    b. 0.5
    c. 0
    d. Infinity

13. Consider a beam with circular cross-section of diameter'd'. The ratio of the second moment of area about the neutral axis to the section modulus of the area is
    a. d/2
    b. πd/2
    c. d
    d. πd

14. The "Jominy test" is used to find
    a. Young's modulus
    b. Hardenability
    c. Yield strength
    d. Thermal conductivity

15. Under optimal conditions of the process the temperatures experienced by a copper work piece in fusion welding, brazing and soldering are such that
    a. $T_{welding} > T_{soldering} > T_{brazing}$
    b. $T_{soldering} > T_{welding} > T_{brazing}$
    c. $T_{brazing} > T_{welding} > T_{soldering}$
    d. $T_{welding} > T_{brazing} > T_{soldering}$

16. The part of a gating system which regulates the rate of pouring of molten metal is
    a. Pouring basin
    b. Runner
    c. Choke
    d. In gate

17. A shaft with a circular cross-section is subjected to pure twisting moment. The ratio of the maximum shear stress to the largest principal stress is
    a. 2.0
    b. 1.0
    c. 0.5
    d. 0

18. A thin cylinder pressure vessel with closed ends is subjected to internal pressure. The ratio of circumferential (hoop) stress to the longitudinal stress is
    a. 0.25
    b. 0.50
    c. 1.0
    d. 2.0

19. Assuming constant temperature condition and air to be an ideal gas, the variation in atmospheric pressure with height calculated from fluid statics is
    a. Linear
    b. Exponential
    c. Quadratic
    d. Cubic

20. The internal energy of an ideal gas is a function of
    a. Temperature and pressure
    b. Volume and pressure
    c. Entropy and pressure
    d. Temperature only

21. The welding process which uses a blanket of fusible granular flux is
    a. Tungsten inert gas welding
    b. Submerged arc welding
    c. Electro slag welding
    d. Thermit welding

22. Which of the bearing given below SHOULD NOT be subjected to a thrust load
    a. Deep groove ball bearing
    b. Angular contact ball bearing
    c. Cylindrical (straight) roller bearing
    d. Single row tapered roller bearing

23. Engineering strain of a mild steel sample is recorded as 0.100%. the true strain is
    a. 0.010%
    b. 0.055%
    c. 0.099%
    d. 0.101%

24. Internal gears are manufactured by
    a. Hobbing
    b. Shaping with pinion cutter
    c. Shaping with rack cutter
    d. Milling

25. A gas is stored in a cylindrical tank on inner radius 7m and wall thickness 50mm. the gauge pressure of the gas is 2 MPa. The maximum shear stress (in MPa) in the wall is
    a. 35
    b. 70
    c. 140
    d. 280

26. In plane stress condition, the components of stress at a point are σ_x = 20MPa, σ_y = 80MPa and τ_{xy} = 40MPa. The maximum shear stress (in MPa) at the point is
    a. 20
    b. 25
    c. 50
    d. 100

27. A single degree freedom spring mass system is subjected to s sinusoidal force of 10N amplitude and frequency ω along the axis of the spring. The stiffness of the spring is 15 N/m, damping factor is 0.2 and the un-damped natural frequency is 10 ω. At steady state, the amplitude of vibration (in m) is approximately
    a. 0.05
    b. 0.07
    c. 0.70
    d. 0.90

28. The head loss for a laminar incompressible flow through a horizontal circular pipe is h1. Pipe length and fluid remaining the same, if the average flow velocity doubles and the pipe diameter reduces to half its pervious value the head loss is h2. The ratio of h2/h1
    a. 1
    b. 4
    c. 8
    d. 16

29. In PERT chart, the activity time distribution is
    a. Normal
    b. Binomial
    c. Poisson
    d. Beta

30. PERT and CPM are
    a. Techniques to determine project status
    b. Decision making techniques
    c. Aids to the decision makers
    d. Charts which increase aesthetic appearance of rooms

31. Match the following products with the suitable manufacturing process

	Product		Manufacturing process
P	Toothpaste tube	1	Centrifugal casting
Q	Metallic pipes	2	Blow moulding
R	Plastic bottles	3	Rolling
S	Threaded bolts	4	Impact extrusion

a. P-4, Q-3, R-1, S-2
b. P-2, Q-1, R-3, S-4
c. P-4, Q-1, R-2, S-3
d. P-1, Q-3, R-4, S-2

32. The minimum axial compressive load P, required to initiate buckling for a pinned-pinned slender column with bending stiffness EI and length L is
a. $P = \pi^2\ EI/4L^2$
b. $P = \pi^2\ EI/L^2$
c. $P = 3\pi^2\ EI/4L^2$
d. $P = 4\pi^2\ EI/4L^2$

33. A particle of unit mass is moving on a plane. Its trajectory, in polar coordinates, is given by $r(t)=t^2$, $\theta(t) = t$; where t is time. The kinetic energy of the particle at time t=2 is
a. 4
b. 12
c. 16
d. 24

34. The damping ratio for a viscous damped spring mass system, governed by the relationship $M\frac{d^2x}{dt^2} + C\ \frac{dx}{dt} + kx = F(t)$, is given by

a. $\sqrt{c/mk}$
b. $c/2\sqrt{km}$
c. $c/\sqrt{km}$
d. $\sqrt{c/2mk}$

35. In an arc welding process, welding speed is doubled. Assuming all other process parameter to be constant, the cross sectional area of the weld bead will
a. Increase by 25%
b. Increase by 50%
c. Reduce by 25%
d. Reduce by 50%

36. A cantilever beam having square cross-section of side ‘a’ is subjected to an end load. If ‘a’ is increased by 19%, the tip deflection decreases approximately by,
    a. 19%
    b. 29%
    c. 41%
    d. 50%

37. The spring constant of a helical compression spring DOES NOT depend on
    a. Coil diameter
    b. Material strength
    c. Number of active turns
    d. Wire Diameter

38. Which of the following statements are TRUE with respect to heat and work
        I. They are boundary phenomena
        II. They are exact differentials
        III. They are path functions
    a. Both (i) and(ii)
    b. Both (i) and (iii)
    c. Both (ii) and (iii)
    d. Only (iii)

39. For the same values of peak pressure, peak temperature and heat rejection, the correct order of efficiencies for Otto, Dual and Diesel cycle is
    a. $\eta_{otto} > \eta_{Dual} > \eta_{Diesel}$
    b. $\eta_{Diesel} > \eta_{Dual} > \eta_{otto}$
    c. $\eta_{Dual} > \eta_{Diesel} > \eta_{otto}$
    d. $\eta_{Diesel} > \eta_{otto} > \eta_{Dual}$

40. Within a boundary layer for a steady incompressible flow, the Bernoulli equation
    a. Hold because the flow is steady
    b. Hold because the flow is incompressible
    c. Hold because the flow is transitional
    d. Does not hold because the flow is frictional

41. Which two of the following joining process are autogeneous
    (i) Diffusion welding
    (ii) Electro slag welding
    (iii) Tungsten inert gas welding
    (iv) Friction welding
    a. (i) and (iv)
    b. (ii) and (iii)
    c. (ii) and (iv)
    d. (i) and (iii)

42. The major difficulty during welding of aluminum is due to its
    a. High tendency of oxidation
    b. High thermal conductivity
    c. Low melting point
    d. Low density

43. To solve the FEM problem, it subdivides a large problem into smaller, simpler parts that are called
    a. Finite elements
    b. Infinite elements
    c. Dynamics elements
    d. Static elements

44. FEM gives accurate representation of
    a. Real geometry
    b. Complex geometry
    c. Real and complex geometry
    d. Constant geometry

45. The following is true for a robot and NC machine
    a. Similar power drive technology is used in both
    b. Different feedback system are used in both
    c. Programming is same for both
    d. All of the above

46. In a CAD package, mirror image of a 2D point P (5,10) is to be obtained about a line which passes through the origin and makes an angle of 45^0 counter clockwise with the x-axis. The coordinates of the transformed point will be
    a. (7.5, 5)
    b. (10, 5)
    c. (7.5, -5)
    d. (10, -5)

47. In computer aided drafting practice, an arc is defined by
    a. Two end point only
    b. Center and radius
    c. Radius and one end point
    d. Two end points and center

48. The shape of the Bezier curve is controlled by
    a. Control points
    b. Knots
    c. End points
    d. All the above

49. Changing position of an object against an opposing force is called
    a. Power
    b. Torque
    c. Energy
    d. Work

50. The ease with which a liquid changes to a vapour is called its
    a. Vaporability
    b. Boiling point
    c. Viscosity
    d. Volatility

51. Aluminum alloy pistons are preferred because
    a. They are good absorbers of shock
    b. They are having less weight
    c. They have good water resistance
    d. They are very strong in tension

52. Whirling of the propeller shaft is mainly due to
    a. The transmission of torsional vibration of the crankshaft
    b. The use of a sliding joint in the propeller shaft
    c. The use of universal joint in the drive
    d. Lack of balance and excessive length of propeller shaft

53. In a diesel engine the fuel injection pressure is in the range
    a. 100 to 170 atm
    b. 60 to 70 atm
    c. 30 to 40 atm
    d. 20 to 25 atm

54. The coefficient of rolling resistance for a truck weighing 63 500 N is 0.018. The rolling resistance to the truck is
    a. 1.143 N
    b. 11.43 N
    c. 114.3 N
    d. 1143 N

55. If the air-fuel mixture ignites before the spark takes place at spark plug, the condition is called
    a. Detonation
    b. Pre-ignition
    c. Ignition
    d. Rumble

56. The natural gas in compressed in a CNG cylinder at a pressure of
    a. 200 bar
    b. 220 bar
    c. 250 bar
    d. 300 bar

57. A closed system is one in which
    a. Mass does not cross boundaries of the system, though energy may do so.
    b. Mass crosses the boundary but not the energy
    c. Neither mass not energy crosses the boundaries of the system
    d. Both the energy and mass cross the boundaries of the system.

58. The value of n=1 in the polytrophic process indicate it to be
    a. Reversible process
    b. Isothermal process
    c. Adiabatic process
    d. Irreversible process

59. Otto cycle consists of following four processes
    a. Two isothermal and two isentropic
    b. Two isentropic and two constant volume
    c. Two isentropic, one constant volume and constant pressure
    d. Two isentropic and two constant pressure

60. Resilience of a material is important, when it is subjected to
    a. Combined loading
    b. Fatigue
    c. Wear and tear
    d. Shock loading

61. Queuing theory is associated with
    a. Sales
    b. Inspection time
    c. Production time
    d. Waiting time

62. Break-even analysis consists of
    a. Fixed cost
    b. Variable cost
    c. Fixed and variable cost
    d. Operation cost

63. Which of the following is a fire tube boiler
    a. Locomotive boiler
    b. Babcock and Wilcox boiler
    c. Stirling boiler
    d. All of the above

64. An economizer is a boiler
    a. Increase steam pressure
    b. Increase steam flow
    c. Decrease fuel consumption
    d. Decrease steam pressure

65. Which of the following is not a vector quantity
    a. Weight
    b. Velocity
    c. Acceleration
    d. Force

66. The unit of radio-activity is
    a. Electron-volt
    b. Electron-ampere
    c. Curie
    d. MeV

67. In a diesel engine, the fuel is ignited by
    a. Spark
    b. Injected fuel
    c. Heat resulting from compressing air that is supplied for combustion
    d. Ignition

68. The air-fuel ratio of the petrol engine is controlled by
    a. Fuel pump
    b. Governor
    c. Injector
    d. Carburetor

69. Rain drops are spherical because of
    a. Viscosity
    b. Air resistance
    c. Surface tension force
    d. Atmospheric pressure

70. The stagnation pressure rise in a centrifugal compressor takes place
    a. In the diffuser only
    b. In the impeller only
    c. In the diffuser and impeller
    d. In the inlet guide vanes only

71. Discharge of centrifugal pump is
    a. Directly proportional to diameter of its impeller
    b. Inversely proportional to diameter of its impeller
    c. Directly proportional to $(\text{diameter})^2$ of its impeller
    d. Inversely proportional to $(\text{diameter})^2$ of its impeller

72. Multi-stage centrifugal pumps are used to
    a. Give high discharge
    b. Produce high head
    c. Pump viscous fluid
    d. All of the above

73. Hooke's ;law holds good upto
    a. Yield point
    b. Limit of proportionality
    c. Breaking point
    d. Elastic limit

74. If equal and opposite forces applied to a body tend to elongate it, the stress so produced is called
    a. Tensile stress
    b. Compressive stress
    c. Working stress
    d. Internal resistance

75. The ultimate tensile stress of a mild steel material compared to ultimate compressive stress is
    a. Same
    b. More
    c. Less
    d. More or less depending on other factors

76. Sensible heat is the heat required to
    a. Change vapor to liquid
    b. Change liquid to vapor
    c. Increase the temperature of liquid to vapor
    d. Convert water into steam and superheat it

77. Forces are called concurrent when their lines of action meet in
    a. One point
    b. Two point
    c. Plane
    d. Perpendicular planes

78. When trying to turn a key into a lock, following is applied
    a. Coplanar forces
    b. Non-coplanar forces
    c. Moment
    d. Couple

79. Corrosion resistance in steel is increased by adding
    a. Chromium and nickel
    b. Nickel and molybdenum
    c. Aluminum and zinc
    d. None of the above

80. The relative coefficient of performance is
    a. Actual COP/ theoretical COP
    b. Theoretical COP/ actual COP
    c. Actual COP * theoretical COP
    d. Theoretical COP* actual COP

MTech CET Sample Paper

Naval Architecture & Ocean Engineering Questions

1. A ship has a half circular cross section with breadth equal to diameter and draught equal to radius. Which of the following values will be its midship area coefficient?
    a. 0.565
    b. 0.455
    c. 0.785
    d. 0.654

2. A rectangular barge of length 100m and breadth 17m is floating in fresh water at a draught of 4m. If a weight of 42.5 tonnes is added at centre of flotation to it what will be its new draught?
    a. 0.015
    b. 0.025
    c. 0.031
    d. 0.045

3. For a floating vessel to be stable, the centre of gravity should be
    a. above metacenter
    b. below metacenter
    c. equal to metacenter
    d. None of the above

4. A rectangular barge of breadth 17m is floating in fresh water at a draught of 4m.Which of the following values will be nearest to its metacentric radius?
    a. 4m
    b. 5m
    c. 6m
    d. 8m

5. The sectional area curve of a ship is a trapezium having 50% of length as parallel middle body. What will be its prismatic coefficient?
    a. 0.55
    b. 0.65
    c. 0.75
    d. 0.85

6. A rectangular barge of length 90m and breadth 16m is floating in fresh water at a draught of 3m. If a weight of 25t is shifted from ford to aft through a distance of 50m, what will be the trim by aft?
    a. 0.03472 m
    b. 0.0694 m
    c. 0.0254 m
    d. None

7. The sectional area curve of a ship is triangular with the maximum ordinate being at midship. What is the prismatic coefficient
    a. 0.65
    b. 0.6
    c. 0.55
    d. 0.5

8. For a submerged vessel to be in stable equilibrium
    a. centre of gravity should be above centre of buoyancy
    b. centre of gravity should be below centre of buoyancy
    c. centre of buoyancy should coincide with transverse metacenter
    d. None of the above

9. What is the usual effect of moving weight from low in the vessel to above the main deck?
    a. The stability is increased.
    b. The draft is increased.
    c. The stability is decreased.
    d. The reserve buoyancy is decreased.

10. The horizontal distance between the vertical lines of action of gravity and the buoyant forces is called the _____.
    a. righting arm
    b. metacentric height
    c. metacentric radius
    d. height of the center of buoyancy

11. When a floating Vessel inclines to an angle slightly greater than the angle of loll, it will _____.
    a. Capsize
    b. incline further
    c. flop to the other side
    d. return to the angle of loll

12. Damage stability of a Ship is the stability _____.
    a. which exists when the wind speed is less than 50 knots
    b. before collision
    c. after flooding
    d. at survival draft

13. Keeping the draft of a ship at, or below the load line mark, insures the unit will have adequate _____.
    a. reserve ballast
    b. reserve buoyancy
    c. lightweight displacement
    d. critical motion

14. What will the effect on GM_T, if a half filled cargo hold tank of a crude oil tanker is divided transversely?
    a. Increases
    b. Decreases
    c. Remains same
    d. none of the above
    Answer C

15. Catamaran is more stable that monohull because of its
    a. higher value of I_T
    b. higher value of I_L
    c. Lower Value of I_T
    d. Lower Value of I_L

16. Choose a correct statement from the below option, if Reynolds number, Euler number of ship and model are made equal simultaneously
    a. Pressure of ship more than model
    b. Pressure of ship equal to pressure of model
    c. Pressure of ship less than model
    d. None of the above

17. In shallow waters beyond critical speed, which type of waves will be emanating from the pressure point:
    a. Transverse waves
    b. Diverging waves
    c. Transverse and diverging waves
    d. Single crest through the point and at right angle

18. Which of the following ships having same speed and length have a higher air resistance
    a. Bulk carrier
    b. Tanker
    c. General cargo ship
    d. Passenger Vessel

19. Which of the following methodical series is for high speed round bilge vessel
    a. BSRA Series
    b. MARAD Series
    c. NPL Series
    d. Series62

20. The dimensional formula of coefficient of viscosity is
    a. $[M\ L\ T^{-1}]$
    b. $[M^{-1}\ L^{2}\ T^{-2}]$
    c. $[M\ L^{-1}\ T^{-1}]$
    d. None of these

21. In the ship model experiment, which of the similarity between model and full scale cannot be achieved
    a. Froude number similarity
    b. Reynolds number similarity
    c. Euler number similarity
    d. weber number similarity

22. A ship has a length of 144 m, a breadth of 23 m and a draught of 8 m. the block coefficient is 0.8 and the wetted surface 4850 m^2. What should the displacement of the model be if the model is of scale ratio 25?
    a. 0.567 t/m3
    b. 0.986 t/m3
    c. 1.357 t/m3
    d. None of the above

23. For a vessel, if the first trough of the bow wave system is seem coinciding with the stern trough. The it is call as
    a. Max hump speed
    b. Max hollow speed
    c. Min hump speed
    d. Min hollow speed

24. What are the components of resistance for a ship moving in ideal fluid
    a. Viscous resistance & residuary resistance
    b. Pressure resistance & residuary resistance
    c. Pressure resistance & Wave making resistance
    d. None of the above

25. A single pressure point travelling in a straight line over the surface of the water consists of transverse waves and divergent waves. The whole pattern being contained within two straight lines starting from the pressure point and making angles of_____ on each side of the line of motion
    a. 18 deg 28 min
    b. 19 deg 29 min
    c. 16 deg 27 min
    d. 19 deg 28 min

26. The propeller blade sections of Gawn series are
    a. Aerofoil sections
    b. Segmental sections
    c. Lenticular sections
    d. Combination of Lenticular and Aerofoil sections

27. From the open water characteristics of a propeller. What will the value of efficiency when $K_T=0$
    a. 0.68
    b. 0.5
    c. 0
    d. 1

28. Contra-rotating propellers consists of
    a. Two propellers rotating in same direction on coaxial shaft
    b. Two propellers rotating in opposite direction on coaxial shaft
    c. Two propellers rotating in same direction on a single shaft
    d. All of the above

29. Cavitation at a particular location of the propeller indicated a region of
    a. Higher pressure and low velocity
    b. Low pressure and low velocity
    c. Low pressure and high velocity
    d. High pressure and high velocity

30. For analyzing the data of self-propulsion experiment what other experimental data is required
    a. Resistance experiment data
    b. Open water experiment data
    c. Cavitation experiment data
    d. Resistance and open water experiments data

31. The ratio of maximum blade thickness extrapolated to zero radius, divided by the propeller diameter is called
    a. Boss diameter ratio
    b. Blade thickness ratio
    c. Thickness chord ratio
    d. Pitch ratio

32. The ratio of the propeller efficiency in the behind condition to the open water efficiency is called
    a. Hull efficiency
    b. Propulsive efficiency
    c. Relative rotative efficiency
    d. Shafting efficiency

33. when viewing from the aft if a propeller is revolves in the clockwise direction moving the vessel forward, it is said called as a
    a. right handed propeller
    b. Left handed propeller
    c. Center Propeller
    d. None of the above

34. What is the cause of wake velocity which is created behind the ship by its forward motion
    a. Potential wake
    b. Boundary layer wake
    c. Wave wake
    d. All the above

35. Considering still water bending of the ship girder, if the ship's middle hold is loaded other holds being empty, will the ship experience
    a) Hogging bending moment
    b) Sagging bending moment
    c) Both
    d) None

36. Which portion of the ship is mainly affected due to slamming
    a. fore body
    b. midship region
    c. aft body
    d. whole of the ship

37. Which of the following grades of steel have a higher minimum yield strength
    a. Grade A
    b. Grade B
    c. Grade AH32
    d. Grade DH36

38. A thin mild steel wire is loaded by adding loads in equal increments till it breaks. The extensions noted with increasing loads will behave as under
    a. increase uniformly
    b. first increase and then decrease
    c. increase rapidly first and then uniformly.
    d. increase uniformly first and then increase rapidly

39. The ultimate tensile stress of mild steel compared to ultimate compressive stress is
    a. Same
    b. More
    c. Less
    d. more or less depending on other factors

40. The buckling load for a given material depends on
    a. slenderness ratio and area of cross-section
    b. Poisson's ratio and modulus of elasticity
    c. slenderness ratio and modulus of elasticity
    d. slenderness ratio, area of cross-section and modulus of elasticity

41. A beam is loaded as cantilever. If the load at the end is increased, the failure will occur
    a. in the middle
    b. at the tip below the load
    c. at the support
    d. anywhere

42. Identify the motion that has a restoring force/moment term in the equation of motion
    a. Surge
    b. Yaw
    c. Pitch
    d. Sway

43. Significant wave height is defined as
    a. average height of waves
    b. average of one third highest waves
    c. average of one fifth highest waves
    d. average of one tenth highest waves

44. ITTC spectrum is based on
    a. Bretschneider Spectrum
    b. JONSWAP Spectrum
    c. Pierson-Mosowitz Spectrum
    d. All the above

45. Beaufort scale is used to describe the sea condition with reference to
    a. Significant wave height
    b. current speed
    c. wind speed
    d. ship speed

46. The equation of motion for a system may be written as: $a\ddot{x}+b\dot{x}+c\,x=P=P_a\cos\omega_e t$. In this equation if $b=0$ and $P\neq 0$ represents,
    a. Free undamped oscillation
    b. Free damped oscillation
    c. Forced undamped oscillation
    d. Forced damped oscillation

47. Identify the encounter frequency for a ship that has a speed of 15knots & heading into a series of regular waves of length 125m at an angle of 20 degrees.
    a. 0.55 Hz
    b. 0.48 Hz
    c. 0.28 Hz
    d. 0.34 Hz

48. Seakeeping Performance Index – II is based on
    a. Mission effectiveness
    b. Speed effectiveness
    c. Transit time index
    d. None of the above

49. In a speed polar plot, unshaded region represents,
    a. unacceptable combinations of heading & speed
    b. operable combinations of speed & heading
    c. dominant wave direction
    d. all the above

50. Identify the active roll stabilizers
    a. Active Tank stabilizers
    b. Fin stabilizers
    c. Gyroscopic stabilizers
    d. All the above

51. Magnification factor of an oscillating system is
    a. $\frac{\omega_e}{\omega_n}$
    b. $\frac{b}{2a}$
    c. $\frac{P_a}{c}$
    d. $\frac{x_a}{x_{static}}$

52. Under-balanced rudder represents centre of pressure is,
    a. Aft of rudder axis
    b. forward of rudder axis
    c. on rudder axis
    d. none of the above

53. Course stability of a hull form can be accessed by
    a. stability indexes
    b. Z-manoeuvre
    c. Pull-out manoeuvre
    d. all the above

54. The speed loss in a turn depends on
    a. block coefficient
    b. type of propulsion machinery
    c. tightness of turn
    d. all the above

55. Identify the hydrodynamic derivative that cannot be evaluated by conducting a straight line/oblique test
    a. Y_r
    b. Y_v
    c. N_v
    d. All the above

56. As per IMO manoeuvring standards, for a commercial vessel of more than 100 m length, advance of a vessel during turning circle manoeuvre should not exceed (L:Length of ship)
    a. 5L
    b. 4.5L
    c. 2.5L
    d. 3.5L

57. For a rectangular rudder, aspect ratio will be
    a. Chord/span
    b. span/chord
    c. tip chord/root chord
    d. root chord/tip chord

58. On merchant ships, rudder stock size can be reduced by use of which type of rudder
    a. Horn rudder
    b. spade rudder
    c. fully balanced rudder
    d. compound butt rudder

59. The hull derivative Y_v is always
    a. Positive value
    b. Zero
    c. negative value
    d. imaginary value

60. In a turning circle manoeuvre when the rudder is kept at 35 deg starboard, during the steady phase the vessel will
    a. Heel to Port
    b. heel to starboard
    c. not heel
    d. None of the above

61. In rotating arm test, the hydrodynamic derivatives can be accurately estimated by
    a. conducting the test in a conventional towing tank
    b. conducting the test in a specialized smaller size facility
    c. conducting the test in a specialized larger size facility
    d. None of the above

62. Which of the following ship of the same length has a higher freeboard
    a. Tanker
    b. Bulk carrier
    c. Fishing Vessel
    d. Container vessel

63. For a depth of 1000m and above, which of the following platform can be selected for offshore oil production.
    a. Gravity Platform
    b. Jacket Platform
    c. TLP
    d. Jack-up Platform

64. Which has a higher value – GRT or NRT?
    a. GRT
    b. NRT
    c. Both are equal
    d. None

65. The total weight of a ship is
    a. equal to the moulded displacement of the ship
    b. equal to the extreme displacement of the ship
    c. less than both the above
    d. none of the above

66. Top Sloping tanks are provided in a bulk carried to
    a. avoid shifting of cargo
    b. reduce the loss in GM_T
    c. Both of the above.
    d. None of the above.

67. When involved in fighting a fire aboard a ship with an aluminum superstructure, it is important to remember that aluminum structures exposed to the high heat _____.
    a. Generate poisonous fumes
    b. Are more susceptible to collapse than steel structures
    c. Are susceptible to spontaneous ignition
    d. all of the above

68. Which of the following components are included in light ship weight
    a. weight of provisions and water supplies
    b. weight of the payload
    c. weight of liquids in pipes
    d. None of the above

69. EEDI can be expressed as a ratio of
    a. Impact to environment / Benefit for society
    b. CO_2 Emission / Transport Work
    c. Both of the above
    d. None of the above

70. The curvature of the deck in transverse direction is known as
    a. Camber
    b. Flare
    c. Deadrise
    d. Tumblehome
71. What is the deepest part of the world's oceans
    a. Mariana Trench
    b. South sandwich trench
    c. Japan trench
    d. Kermadec trench

72. The average salinity of world oceans
    a. 30
    b. 28
    c. 38
    d. 35

73. Structures build normal to the shore towards sea are called
    a. Jetty
    b. Groins
    c. Break water
    d. Piles

74. Plants grow near estuaries are called
    a. Mangroves
    b. Marine plants
    c. Algae
    d. None

75. Coriolis force near the equator
    a. 90
    b. 0
    c. 45
    d. 60

76. Wind circulation during a tropical cyclone is
    a. Anticlockwise
    b. Curved
    c. Straight
    d. Clockwise

77. Speed of sound in sea water is
    a. 1000 m/sec
    b. 500 m/sec
    c. 1500 m/sec
    d. 800 m/sec

78. Tides during full moon are called as
    a. Neap tide
    b. Spring Tide
    c. Both of the above
    d. None of the above

79. Ocean Surface waves are of _____type
    a. Longitudinal waves
    b. Transverse waves
    c. Square waves
    d. None

80. Average speed of tsunami waves are about____
    a. 1200 km/hr
    b. 700 km/hr
    c. 300 km/hr
    d. 1400 km/hr

MTECH CET – SAMPLE PAPER FOR CIVIL ENGINEERING

1. Elasticity of a body is

   (a) the property by which a body returns to its original shape after removal of the load

   (b) the ratio of stress to strain

   (c) the resistance to the force acting

   (d) Large deformability as in case of rubber.

2. The law "Stress is proportional to strain within certain limits" is formulated by

   (a) Thomas young (c) Mohr
   (b) Poisson (d) Robert Hook

3. The percentage elongation of a material from a direct tensile test indicates

   (a) Ductility (c) yield stress
   (b) Strength (d) ultimate strength

4. The angle between the two principal planes is

   (a) 45 degree (c) 30 degree
   (b) 90 degree (d) 60 degree

5. The maximum shear stress from a Mohr's circle is given by

   (a) The diameter of the circle
   (b) The distance of centre from the origin
   (c) The distance of farthest point on the Mohr's circle from origin
   (d) The radius of the circle

6. The stress along the contact surface of a rivet and the member is

   (a) Bearing stress (c) shearing stress
   (b) Compressive stress (d) axial tensile stress

7. If the Poisson's ratio of a material is 0.25, the ratio of Modulus of Rigidity to the Young's Modulus is

(a) 2 (c) 2.5
(b) 0.4 (d) 4

8. A cantilever beam is one which is supported with

(a) One end hinge and other on rollers
(b) One end fixed and the other on rollers
(c) Both ends on rollers
(d) One end fixed and the other free

9. A simply supported beam is subjected to a udl of intensity w/m throughout the length of the span. The B.M. diagram will be a

(a) Triangle with $wl^2/8$ max. ordinate
(b) Rectangle with uniform ordinate $wl^2/8$
(c) Parabola with $wl^2/8$ max. ordinate
(d) Parabola with wl/4 max. ordinate

10. The bending moment in a beam will be maximum where

(a) The S.F. is uniform (c) the S.F. is zero
(b) The S.F.is maximum (d) none of these

11. Points of contraflexture are the points where

(a) The S.F. is zero (c) the beam is supported
(b) The B.M is zero (d) the B.M. changes its sign

12. A rectangular section 100 x 200mm is subjected to a moment of 20 KNm. The maximum bending stress is

(a) 30 N/mm^2 (c) 10000 N/mm^2
(b) 5/6 N/mm^2 (d) 300 N/mm^2

13. The moment of inertia of triangular section b x h, about the base is

(a) $bh^3/12$ (c) $bh^3/36$
(b) $b^2h^2/2$ (d) $b^2h^2/36$

14. The product EI is called

(a) flexural rigidity (c) second moment of area
(b) torsional rigidity (d) none of these

15. When a member is subjected to a twisiting moment, an element on the surface is subjected to

(a) axial tension
(b) shear stresses
(c) bending stresses
(d) axial compressive stress

16. The famous arch dam in India is at

(a) Bhakra
(b) Khadakvasla
(c) Nagarjuna Sagar
(d) Idikki

17. Guide bank is also known as

(a)groyne
(b) Spur
(c) marginal bund
(d) Bell's bund

18. According to Chezy's equation, the maximum discharge in a circular channel of Diameter D occurs when the depth of flow is

(a) 0.95D (b) 0.5 D (c) 0.75D (d) 0.81D

19. Water hammer in penstock pipes is caused by

(a) sudden changes in water level of the reservoir

(b) sudden changes in discharge

(c) gradual changes in discharge

(d) sudden change in temperature

20. A pelton wheel is

(a) a tangential flow impulse turbine

(b) an inward flow impulse turbine

(c) an inward flow reaction turbine

(d) an outward flow reaction turbine

21. The ratio of inertial force to gravity force is called

(a) Gravity number
(b) Reynold's number
(c) Weber number
(d) Froude number

22. When the Mach number is between _____ the flow is called super – sonic flow.

(a) 1 and 2.5
(b) 2.5 and 4
(c) 4 and 6
(d) 1 and 6

23. In a forced vortex, the velocity of flow everywhere within the fluid is

(a) Maximum (b) minimum
(c) zero (d) non zero infinite

24. A fluid which obeys the Newton's law of viscosity is termed as

(a) Real fluid (b) Ideal fluid

(c) Newtonian fluid (d) Non – Newtonian fluid

25. Dimensions of surface tension are

(a) ML^0T^{-2} (b)ML^0T (c) ML^2T (d) ML^2T^2

26. The property of fluid by virtue of which it offers resistance to shear is called

(a) surface tension (b)Adhesion (c) Cohesion
(d) viscosity

27. Differential manometer is used to measure

(a) Pressure in pipes, channels etc.

(b) Atmospheric pressure

(c) very low pressure

(d) Difference of pressure between two points

28. A flow through an expanding tube at constant rate is called

(a) steady uniform flow

(b) steady non- uniform flow

(c) unsteady uniform flow

(d)unsteady non-uniform flow

29. The flow in a pipe is neither laminar nor turbulent when Reynolds number is

(a) Less than 2000

(b) between 2000 and 2800

(c) more than 2800

(d) none of these

30. The two important forces for a floating body are

(a) Buoyancy, gravity

(b) Buoyancy, pressure

(c) Buoyancy, inertial

(d) Inertial, gravity

31. A chain may get elongated due to

(a) Change in temperature

(b) difference in pull

(c) opening of rings

(d) kinks in links

32. The length of an Engineer's chain is

(a) 20 m

(b) 33 feet

(c) 66 feet

(d) 100 feet

33. When a chain line encounters a river

(a) chaining is obstructed but ranging is free

(b) ranging is obstructed but changing is free

(c) both ranging and chaining are obstructed

(d) both ranging and chaining are free

34. The magnetic bearing of a line is N88°E. Its true bearing is S 89° E. Therefore its magnetic declination is

(a) 2° W (b) 3° W (c) 3°E (d)91°

35. Isogonic lines are the lines having the same

(a) elevation (b) bearing (c) declination (d) dip

36. An example of a level surface is

(a) surface of earth

(b) surface of sea

(c) surface of a reservoir

(d) surface of a still lake

37. The very first reading taken is called

(a) back sight

(b) fore sight

(c) intermediate sight

(d)invert

38. A bench mark is a

(a) Reference point (b) the very first station

(c) the last station where the survey closes (d) point of known elevation

39. A contour map of the area is essential before proceeding with the construction of

(a) a building (b) a swimming pool (c) a dam

(d) a bridge.

40. Anallactic lens is a

(a) convex lens (b) concave lens

(c) compound concave and convex lens (d) plain lens.

41. A pressure of one millibar is equal to

(a) 100 N/m^2 (b) 1000 N/m^2 (c) 10000 N/m^2
(d) 100000 N/m^2

42. Isobar is a line which joins points of equal

(a) rainfall depth (b) temperature (c) humidity
(d) atmospheric pressure

43. The instrument used to measure the wind velocity in the atmosphere is

(a) current meter (b) atmometer (c) Pyranometer
(d) anemometer

44. Pyranometer is the instrument which measures

(a) the duration of sunshine (b) radiation (c) evaporation
(d) none of the above

45. Direct runoff is the sum of

(a) the surface runoff and the base flow

(b) the base flow and the ground water runoff

(c) the delayed subsurface runoff and deep percolation

(d) the surfaces runoff and the prompt sub-surface runoff

46. Darcy's law gives the velocity of flow in

(a) open channels (b) pipes (c)porous medium (d) pumps

47. Removal of soil particles from the present location is known as

(a) Sedimentation (b) saltation (c) erosion (d) excavation

48. The soil which contains 'finest particles' is

(a) silt (b) Gravel (c) Clay (d) Sand

49. The ratio of volume of voids to the total volume of a given soil is

(a) void ratio (b) porosity (c) air content (d) air ratio

50. Relationship between void ratio e and porosity n is given by

(a) e=n(1+n) (b) e=n(1+e) (c) e=n(1-e) (d) e=n(1+n)

51. The maximum size of clay particles is

(a) 0.002mm (b) 0.04mm (c) 0.06mm (d) 0.08mm

52. The effective size of the soil is

(a) D_{15} (b) D_{85} (c) D_{10} (d) D_{50}

53. In the field, sand can be distinguished from silt by

(a) Shaking test (b) Dilatancy test (c) dispersion test (d) rolling test

54. The minimum water content at which the soil just begins to crumble when rolled into threads of 3mm in diameter is known as

(a) Shrinkage limit (b) plastic limit (c) liquid limit (d) consistency limit

55. The difference between plastic limit and shrinkage limit is called

(a) Fluidity index (b) relative consistency

(c) plasticity index (d) shrinkage index

56. Quick sand is

(a) pure silica sand

(b) a condition in which cohesion is decreased quickly

(c) a sand which can act as a quick filter

(d) a condition in which cohesion less soil looses its shear strength due to the upward flow of water

57. When the steady seepage occurs in an isotropic soil, the head causing the flow satisfies the following equation

(a) Darcy's equation (b) Hazen's equation
(c) Lapace's equation (d) none

58. A coarse grained soil has a void ratio of 0.7 and specific gravity of 2.7. the critical gradient at which the quick sand condition occurs is

(a) 1.00 (b) 0.75 (c) 0.5 (d) 0.25

59. The seepage flow through a porous medium is generally

(a) turbulent (b) super critical (c) transitional
(d) Laminar

60. The unit of the coefficient of consolidation is

(a) cm^2/cm (b) cm/sec (c) cm^2/sec
(d) $gm\text{-}cm^2/sec$

61. A clay deposit suffers a total settlement of 10cm with one way drainage, then with two way drainage, it suffers a total settlement of

(a) 20 cm (b) 5 cm (c) 10 cm (d) Nil

62. The most effective method for compacting sand is by using

(a) pneumatic rollers (b) Sheep foot rollers

(c) steel tyred rollers (d) vibration

63. The admixture used in soil stabilization is

(a) cement (b) lime (c) bituemen
(d)any of the above

64. Select the incorrect statement

(a) the stresses increases with depth because of over burden pressure

(b) the stresses decreases with depth because of the applied load

(c) the stresses decreases with depth in case of both overburden and applied loads

(d) None of the above

65. Generally hand augers are used when the depth is about

(a) 6m (b) 12m (c) 25m (d) 37m

66. The pictorial representation of activities and events of a project is known as the

(a) flow chart (b) flow net (c) algorithm
(d) Net work

67. Bar charts are suitable only for

(a) minor projects (b) medium projects (c) major projects
(d) all the above

68. PERT is

(a) activity oriented (b) event oriented
(c)time oriented (d) resource oriented

69. Total cost is

(a) direct cost (b) direct cost + indirect cost

(c) over heads (d) outage loss

70. The probability distribution taken to represent the completion time in PERT analysis is

(a) Gamma distribution (b) Normal distribution

(c) Beta distribution (d) Log – normal distribution

71. The normal grades of concrete used in reinforced concrete buildings are

(a) M15, M20, M25 (b) M7.5, M10, M15
(c) M5, M7.5, M10 (d) M20, M25, M30

72. The design shear stress in reinforced cement concrete depends on

(a) characteristic strength of concrete

(b) percentage of longitudinal tensile reinforcement

(c) characteristic strength of steel

(d) both (a) and (b)

73. The main reinforcement in R.C.C. continuous members is placed at

(a) top fibre (b) side fibres (c) bottom fibres
(d) top and bottom fibres.

74. The shape of the stress –strain curve for compression in concrete is generally taken to be

(a) hyperbolic (b) straight line (c) rectangular
(d) parabolic

75. The partial factor of safety for steel in limit state design is

(a) 1.65 (b) 1.75 (c) 1.50 (d) 1.15

76. The minimum cover to the main bars in R.C.C. beam must be

(a) 15mm or diameter of the bar (b) 25mm or diameter of the bar
(c) 40mm or diameter of the bar (d) 25mm or size of the coarse aggregate

77. Generally for piles, the concrete used is of grade

(a) M 10 (b) M 15 (c) M 20 (d) M 30

78. The most commonly used deep foundation in buildings

(a) well foundation (b) pile foundation
(c) raft foundation (d) grillage foundation

79. When two or more individual column footings are joined by a beam, it is called

(a) strip footing (b) step footing
(c) combined footing (d) strap footing

80. The surface of the wall exposed to weather is called

(a) the face (b) the back
(c) the side (d) perpend