ENGINEERING KNOWLEDGE TEST (EKT)
MECHANICAL STREAM

BOOKLET SERIES 'E'

Set No 2/15 **TIME ALLOTTED : 45 MINUTES**

INSTRUCTIONS FOR CANDIDATES

1. **Total number of Questions 50. Each Question carries three marks.**
2. **One mark will be deducted for every wrong answer.**
3. **No mark will be deducted for un-attempted questions.**

Q1. Three houses are available in a locality. Three persons apply for the houses. Each applies for one house without consulting others. The probability that all the three apply for the same house is
(a) 2/9 (b) 1/9 (c) 8/9 (d) 7/9

Q2. If the area of the square is increased by 69% the side of the square increases by
(a) 13% (b) 30% (c) 39% (d) 130%

Q3. A can solve 90% of the problems given in a book and B can solve 70%. What is the probability that at least one of them will solve a problem, selected at random from the book?
(a) 0.16 (b) 0.63 (c) 0.97 (d) 0.20

Q4. An unbiased die with faces marked 1, 2, 3, 4, 5 and 6 is rolled four times. Out of four face values obtained, the probability that the minimum face value is not less than 2 and the maximum face value is not greater than 5 is
(a) 16/81 (b) 1/81 (c) 80/81 (d) 65/81

Q5. The projection of a vector on another vector is
(a) scalar (b) vector
(c) neither vector not scalar (d) either scalar or vector

Q6. During the execution of a CNC part program block NO20 GO2 X45.0 Y25.0 R5.0 the type of tool motion will be
(a) circular Interpolation — clockwise (b) circular Interpolation — counter-clockwise
(c) linear Interpolation (d) rapid feed

Q7. A component can be produced by any of the four processes I, II, III and IV. Process I has a fixed cost of Rs 20 and variable cost of Rs 3 per piece. Process II has a fixed cost of Rs 50 and variable cost of Re 1 per piece. Process III has a fixed cost of Rs 40 and variable cost of Rs 2 per piece. Process IV has a fixed cost of Rs 10 and variable cost of Rs 4 per piece. If the company wishes to produce 100 pieces of the component, from economic point of view it should choose
(a) Process I (b) Process II (c) Process III (d) Process IV

Q8. When a conductor cuts magnetic flux, an emf is induced in the conductor. This is known as
(a) Joule's law (b) Faraday's law (c) Coulomb's law (d) Ampere's law

Q9. X-rays are used for the study of crystal structure because
(a) X-rays are completely absorbed by the crystal
(b) the wavelength of X-ray is of the same order of magnitude in the inter-atomic spacing in crystals
(c) the wavelength of X-rays is very small in comparison with the inter-atomic spacing in crystals
(d) the crystals are completely transparent to X-rays

Q10. A radioactive isotope has a half-life of 10 days. If today there are 125 g of it left, what was its original weight 40 days earlier?
(a) 600 g (b) 1000 g (c) 1250 g (d) 2000 g

Q11. A tensile test is performed on a mild steel round bar. Its diameter after fracture will
(a) remain same (b) increase
(c) decrease (d) depend upon rate of loading

Q12. In an interchangeable assembly, shafts of size 25.000±0.040mm mate with holes of size 25.000±0.020 mm. The maximum possible clearance in the assembly will be
(a) 10 microns (b) 20 microns
(c) 30 microns (d) 60 microns

Q13. The neutral axis of a beam is subjected to _____ stress.
(a) zero (b) maximum tensile
(c) minimum tensile (d) maximum compressive

Q14. When a load on the free end of a cantilever beam is increased, failure will occur
(a) at the free end (b) at the fixed end
(c) in the middle of the beam (d) at a distance 2/3 from free end

Q15. In PERT analysis a critical activity has
(a) maximum float (b) zero float
(c) maximum cost (d) minimum cost

Q16. The capacity of a strained body for doing work on the removal of the straining force, is called
(a) strain energy (b) resilience
(c) proof resilience (d) impact energy

Q17. The hoop stress in a thin cylindrical shell is
(a) longitudinal stress (b) compressive stress
(c) radial stress (d) circumferential tensile stress

Q18. The ratio of specific weight of a liquid to the specific weight of pure water at a standard temperature is called
(a) density of liquid (b) specific gravity of liquid
(c) compressibility of liquid (d) surface tension of liquid

Q19. The purpose of a surge tank is
(a) to control the pressure variations due to rapid changes in the pipe line flow
(b) to eliminate water hammer possibilities
(c) to regulate flow of water to turbines by providing necessary retarding head of water
(d) all of the above

Q20. The S-N curve for steel becomes asymptotic nearly at
(a) 103 cycles (b) 104 cycles
(c) 106 cycles (d) 109 cycles

Q21. The divergent portion of a venturimeter is made longer than convergent portion in order to
(a) avoid the tendency of breaking away the stream of liquid
(b) to minimise frictional losses
(c) both (a) and (b)
(d) none of these

Q22. Silicon in cast iron
(a) makes the iron soft and easily machinable
(b) increases hardness and brittleness
(c) makes the iron white and hard
(d) aids fusibility and fluidity

Q23. The process which improves the machinability of steels, but lowers the hardness and tensile strength, is
(a) normalising (b) full annealing
(c) process annealing (d) spheroidising

Q24. The malleability is the property of a material by virtue of which a material
(a) regains its shape and size after the removal of external forces
(b) retains the deformation produced under load permanently
(c) can be drawn into wires with the application of a tensile force
(d) can be rolled or hammered into thin sheets

Q25. A ladder is resting on a rough ground and leaning against a smooth vertical wall. The force of friction will act
(a) downward at its upper end (b) upward at its upper end
(c) zero at its upper end (d) perpendicular to the wall at its upper end

Q26. Water at 42°C is sprayed into a stream of air at atmospheric pressure, dry bulb temperature of 40°C and a wet bulb temperature of 20°C. The air leaving the spray humidifier is not saturated. Which of the following statements is true?
(a) Air gets cooled and humidified (b) Air gets heated and humidified
(c) Air gets heated and dehumidified (d) Air gets cooled and dehumidified

Q27. The efficiency of a lifting machine is the ratio of
(a) output to the input
(b) work done by the machine to the work done on the machine
(c) mechanical advantage to the velocity ratio
(d) all of the above

Q28. A lot has 10% defective items. Ten items are chosen randomly from this lot. The probability that exactly 2 of the chosen items are defective is
(a) 0.0036 (b) 0.1937 (c) 0.2234 (d) 0.3874

Q29. The gas in cooling chamber of a closed cycle gas turbine is cooled at
(a) constant volume (b) constant temperature
(c) constant pressure (d) none of these

Q30. Which of the following is the correct statement?
(a) For a given compression ratio, both Otto and Diesel cycles have the same efficiency.
(b) For a given compression ratio, Otto cycle is more efficient than Diesel cycle.
(c) For a given compression ratio, Diesel cycle is more efficient than Otto cycle.
(d) The efficiency of Otto or Diesel cycle has nothing to do with compression ratio.

Q31. The temperature at which the volume of a gas becomes zero is called
(a) absolute scale of temperature (b) absolute zero temperature
(c) absolute temperature (d) none of these

Q32. The rotary compressor used in gas turbines is of
(a) centrifugal type (b) axial flow type
(c) radial flow type (d) none of these

Q33. The volume of air delivered by the compressor is called
(a) free air delivery (b) compressor capacity
(c) swept volume (d) none of these

Q34. The efficiency of a jet engine as compared to propeller is higher at
(a) low speeds (b) high speeds
(c) low altitudes (d) high altitudes

Q35. In axial flow compressor, exit flow angle deviation from the blade angle is a function of
(a) blade camber (b) blade camber and incidence angle
(c) space-chord ratio (d) blade camber and space-chord ratio

Q36. Time dependent permanent deformation is called
(a) plastic deformation (b) elastic deformation
(c) creep (d) anelastic deformation

Q37. The vehicle ride will be comfortable if
(a) un-sprung mass is kept minimum (b) sprung mass is kept minimum
(c) vehicle mass is kept minimum (d) all of these

Q38. Figure-out the odd point in the following
(a) proportional limit (b) elastic limit
(c) yield point (d) fracture point

Q39. The aim of value engineering is to
(a) find the depreciation value of a machine
(b) determine the selling price of a product
(c) minimise the cost without change in quality of the product
(d) all of the above

Q40. Gantt chart is used for
(a) inventory control (b) material handling
(c) production schedule (d) machine repair schedules

Q41. The main object of scientific layout is
(a) to produce better quality of product (b) to utilise maximum floor area
(c) to minimise production delays (d) all of these

Q42. Heat is lost from 100 mm diameter steam pipe placed horizontally in ambient temperature of 30^0 C, if the Nusselt number is 25 and thermal conductivity is 0.03 W/mK, then heat transfer coefficient would be
(a) 7.5 W/m^2K (b) 16.2 W/m^2K (c) 25.2 W/m^2K (d) 30 W/m^2K

Q43. 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) vee locator

Q44. Internal gears can be made by
(a) hobbing (b) shaping with pinion cutter
(c) shaping with rack cutter (d) milling

Q45. Air is being forced by the bicycle pump into a tyre against a pressure of 4.5 bars. A slow downward movement of the piston can be approximated as
(a) isobaric process (b) adiabatic process
(c) throttling process (d) isothermal process

Q46. Which one is not the purpose of heat treatment of steels?
(a) changing the composition of steel on the surface
(b) changing the percentage of carbon and Si in the bulk
(c) increasing or decreasing the grain size
(d) removing undesirable residual stresses

Q47. The primary function of the bias circuit is to
(a) hold the circuit stable at V_{CC}
(b) hold the circuit stable at V_{in}
(c) ensure proper gain is achieved
(d) hold the circuit stable at the designed Q-point

Q48. A JFET
(a) is a current-controlled device (b) has a low input resistance
(c) is a voltage-controlled device (d) is always forward-biased

Q49. Which of these is used as a high lift device?
(a) aileron (b) rudder (c) elevators (d) flaps

Q50. Lift of an aircraft when it is flying straight and level is
(a) equal to the weight (b) slightly higher than the weight.
(c) double the weight. (d) none of the above