ENGINEERING KNOWLEDGE TEST (EKT) 20434
MECHANICAL STREAM

BOOKLET SERIES 'E' **TIME ALLOTTED: 45 MINUTES**

INSTRUCTIONS FOR CANDIDATES

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

Q1. 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

Q2. 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

Q3. According to kinetic theory of gases, the absolute temperature is attained when
(a) Volume of the gas is zero
(b) Pressure of the gas is zero
(c) Kinetic energy of the molecules is zero
(d) Specific heat of the gas is zero

Q4. A radioactive isotope has a half-life of 10 days. If today there are 125g of it left, what was its original weight 40 days earlier
(a) 600g (b) 1000g (c) 1250g (d) 2000g

Q5. The compression ratio for petrol engines is
(a) 3 to 6 (b) 5 to 8 (c) 15 to 20 (d) 20 to 30

Q6. If the value of n = 0 in the equation $PV^n = C$, then the process is called
(a) Constant volume process
(b) Adiabatic process
(c) Constant pressure process
(d) Isothermal process

Q7. The hoop stress in a thin cylindrical shell is
(a) Longitudinal stress
(b) Compressive stress
(c) Radial stress
(d) Circumferential tensile stress

Q8. Which is the incorrect statement about Carnot cycle,
(a) It is used as the alternate standard of comparison of all heat engines
(b) All the heat engines are based on Carnot cycle
(c) It provides concept of maximising work output between the two temperature limits
(d) All of the above

Q9. 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 minimize frictional losses
(c) Both (a) and (b)
(d) None of these

Q10. 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

Q11. Kelvin-Planck's law deals with
(a) Conservation of work
(b) Conservation of heat
(c) Conversion of heat into work
(d) Conversion of work into heat

Q12. 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

Q13. 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

Q14. The type of rotary compressor used in gas turbines, is of
(a) Centrifugal type (b) Axial flow type
(c) Radial flow type (d) None of these

Q15. The efficiency of a jet engine is higher at
(a) Low speeds (b) High speeds
(c) Low altitudes (d) High altitudes

Q16. Time dependent permanent deformation is called
(a) Plastic deformation (b) Elastic deformation
(c) Creep (d) Inelastic deformation

Q17. Internal gears can be made by
(a) Hobbing (b) Shaping with pinion cutter
(c) Shaping with rack cutter (d) Milling

Q18. The primary function of the bias circuit is to
(a) Hold the circuit stable at Vcc
(b) Hold the circuit stable at Vin
(c) Ensure proper gain is achieved
(d) Hold the circuit stable at the designed Q-Point

Q19. Lift of an aircraft when it is flying straight and level
(a) Is equal to the weight (b) Slightly higher than the weight
(c) Double the weight (d) None of the above

Q20. The liquid is flowing separately through each of two pipes whose diameters are in the ratio of 2:1, if the ratio of the velocities of flow in the two pipes by 1:2, then the ratio of the amounts of the liquid flowing per sec through the pipe will be
(a) 2:1 (b) 1:1
(c) 4:1 (d) 1:8

Q21. The sum of the age of father and son is 45. Five years back, product of age was 4 times the age of father, what is the age of father and son
(a) 36 years, 9 months (b) 39 years, 6 months
(c) 35 years, 10 months (d) 40 years, 5 months

Q22. For any vector a, the value of $(a*i)^2 + (a*j)^2$ is equal to
(a) $3a^2$ (b) a^2 (c) $2a^2$ (d) $4a^2$

Q23. A single acting reciprocating pump, running at 60RPM, delivers $0.01m^3$/sec of water. The area of the piston is $0.05m^2$ and stroke length is 40cm. Then theoretical discharge of the pump will be
(a) 0.015 m^3/sec (b) 0.02 m^3/sec
(c) 0.025 m^3/sec (d) 0.03 m^3/sec

Q24. Permeance of a magnetic circuit corresponds to the following quantity in electrical circuit
(a) Conductivity (b) Resistivity
(c) Conductance (d) Resistance

Q25. A bar of length 'L' meters extends by 'l' mm under a tensile force of 'P'. Then, the strain produced in the bar is
(a) l/L (b) 0.1l/L (c) 0.01l/L (d) 0.001l/L

Q26. A rod is enclosed centrally in tube and the assembly is tightened by rigid washers. If the assembly is subjected to a compressive load, then
(a) Rod is under compression
(b) Tube is under compression
(c) Both rod and tube are under compression
(d) Tube is under tension and rod is under compression

Q27. Which of the following statement is not true
(a) PERT is probabilistic
(b) CPM is deterministic
(c) In CPM probability to complete a project in given duration is calculated
(d) None of the above

Q28. In a flange coupling, the flanges are coupled together by means of
(a) Bolts and nuts (b) Studs
(c) Headless taper bolts (d) None of these

Q29. In the design of shaft, pulley and key, which is the weakest member?
(a) Shaft (b) Pulley (c) Key (d) None of these

Q30. When the mach number is more than 6, the flow is called
(a) Sub-sonic flow (b) Sonic flow
(c) Super-sonic flow (d) Hyper-sonic flow

Q31. In a multiple disc clutch, if there are 6 discs on the driving shaft and 5 on the driven shaft, how many numbers of pairs of contact surfaces are there
(a) 10 (b) 11 (c) 9 (d) None of these

Q32. In a centrifugal compressor, an increase in speed at a given pressure ratio causes
(a) Increase in flow
(b) Decrease in flow
(c) Increase in efficiency
(d) Increase in flow and decrease in efficiency

Q33. Cast iron during machining produces
(a) Continuous chips
(b) Discontinuous chips
(c) Continuous chips with built-up-edge
(d) None of these

Q34. When a cylinder is located in a V block, the number of degree of freedom would be
(a) 2 (b) 3 (c) 4 (d) 6

Q35. When setting up a mechanical drawing in Auto CAD the drafter should set the units to_____
(a) Fractional (b) Decimal
(c) Architectural (d) Metric

Q36. The magnitude of mutually perpendicular forces a, b and c is 2 and 11 respectively. Then the magnitude of its resultant is
(a) 12 (b) 9
(c) 18 (d) None of the above

Q37. The motion of the cam is transferred to the valves through
(a) Pistons (b) Rocker arms
(c) Camshaft pulley (d) Valve stems

Q38. The position vectors of three consecutive vertices of a parallelogram are i+j+k, i+3j+5k and 7i+9j+11k the position vector of the fourth vertex is
(a) 6(i-j+k) (b) 7(i+j+k) (c) 2j-4k (d) 6i+8j+10k

Q39. The insulation resistance of cable, 1 km long is 1MΩ. Insulation resistance for 2m is
(a) 5MΩ (b) 1 MΩ
(c) 0.5 MΩ (d) 0.002 MΩ

Q40. The centre of gravity of a semi-circle lies at a distance of _____ from its base measured along the vertical radius.
(a) 3r/ 8 (b) 4r/ 3π (c) 8r/3 (d) 3r/4π

Q41. A nozzle placed at the end of a water pipe line discharges water at a
(a) Low pressure (b) High pressure
(c) Low velocity (d) High velocity

Q42. The ratio of the inertia force to the_____ is called Euler's number.
(a) Pressure force (b) Elastic force
(c) Surface tension force (d) Viscous force

Q43. Reheating in a gas turbine
(a) Increase the thermal efficiency (b) Increase the compressor work
(c) Increase the turbine work (d) Decrease the thermal efficiency

Q44. However complex the stress condition may be in body, the principle planes will always be
(a) 1 (b) 2 (c) 3 (d) 4

Q45. Gas turbine as compared to steam turbine
(a) Requires less space for installation
(b) Has compressor and combustion chamber
(c) Has less efficiency
(d) All of these

Q46. High air-fuel ratio in gas turbine
(a) Increases power output (b) Improves thermal efficiency
(c) Reduces exhaust temperature (d) Do not damage turbine blades

Q47. What type of bearing is used for main bearings and connecting rod bearings?
(a) Ball bearings (b) Plain bearings
(c) Needle roller bearings (d) Taper roller bearings

Q48. The tool made of cemented carbide wear out faster at
(a) Slow speeds (b) Medium speeds
(c) Fast speeds (d) Very fast speeds

Q49. In helicopter tail rotor is used to control
(a) Yaw (b) Roll
(c) Pitch (d) Lift

Q50. The hardness of steel depends upon the
(a) Amount of cementite it contains (b) Amount of carbon it contains
(c) Amount of alloying it contains (d) Method of manufacturing of steel