Kurukshetra University Kurukshetra

Ph.D. Entrance Test (Part Time)
Mechanical Engineering

Total Marks: 50   **(No. of Print Pages--11)**

Instructions:
  i.   There are 50 questions in this paper. All questions carry 1 mark
 ii.   There is no negative marking
iii.   Tick Mark the correct option

1. **The purpose of a cylinder head gasket is to**

    (A) Prevent the combustion gases from leaking from the joint between the cylinder block and the cylinder head

    (B) Prevent engine oil from going into combustion chamber

    (C) Removes impurities from cylinder head lubricating oil

    (D) None of the above

2. **During suction stroke, the inside pressure of cylinder is**

    (A) More than the atmospheric pressure

    (B) Less than the atmospheric pressure

    (C) Equal to the atmospheric pressure

    (D) None of these

3. **The ignition in a spark ignition engine takes place when the piston is**

    (A) Exactly at the T.D.C. position on its compression stroke

    (B) Approaching the T.D.C. position on its compression stroke

    (C) Leaving the T.D.C. position on its compression stroke

    (D) Approaching the T.D.C position on its exhaust stroke

4. **The order in which effort applied to the steering wheel is transferred to the front wheel is**

    (A) Steering wheel, steering gearbox, steering shaft, tie rod, steering knuckle, front wheels

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(B) Steering wheel, steering shaft, steering gearbox, tie rod, steering knuckle, front wheels

(C) Steering wheel, steering shaft, steering gearbox, steering knuckle, tie rod, front wheels

(D) Steering wheel, tie rod, steering gearbox, steering shaft, steering knuckle, front wheels

5. **Instead of valves, the ports are used in case of**

   (A) Four stroke I.C. engines

   (B) Two stroke I.C. engines

   (C) V6 engines

   (D) None of these

6. **The purpose of a thermostat in an engine cooling system is to**

   (A) Prevent the coolant from boiling

   (B) Allow the engine to warm up quickly

   (C) Indicate the coolant temperature

   (D) Pressurise the system to raise the boiling point

7. **The heat transfer from coolant to air in the radiator of an automobile engine takes place by**

   (A) Radiation only

   (B) Convention only

   (C) Convection and radiation

   (D) Conduction, convection and radiation

8. **The basic purpose of a four wheel drive (4WD) system is that it**

   (A) Delivers improved cornering on dry road surfaces

   (B) Eliminates the need of snow tyres, tyre chains, etc.

   (C) Ensures effective transmission of engine torque to all four wheels, even on slippery road surfaces

   (D) Ensures that effective braking can be performed, even on slippery surfaces

9. **The sequence in which the force is transmitted through a brake system when the brake pedal is depressed as**

(A) Brake pedal, master cylinder, brake lines, vacuum servo mechanism, brake pads

(B) Brake pedal, vacuum servo mechanism, master cylinder, brake lines, brake pads

(C) Brake pedal, master cylinder, vacuum servo mechanism, brake lines, brake pads

(D) Brake pedal, brake lines, vacuum servo mechanism, master cylinder, brake pads

10. The firing order for an opposed four cylinder l.C. engine is

(A) 1-2-3-4

(B) 1-3-4-2

(C) 1-4-3-2

(D) 1-3-2-4

11. A four cylinder engine has a capacity of 2.4 litres. The swept volume of one cylinder is

(A) 400 cm^3 (B) 600 cm^3 (C) 1200 cm^3 (D) 2400 cm^3

12. An engine has a clearance volume of 100 cm3 and a swept volume of 800 cm3. The compression ratio is (C)

(A) 7 : 1 (B) 8 : 1 (C) 9 : 1 (D) 10 : 1

13. During braking, the brake shoe is moved outward to force the lining against the

(A) Wheel piston or cylinder (B) Anchor pin (C) Brake drum (D) Wheel rim or axle

14. The clutch is located between the transmission and the

(A) Engine (B) Rear axle (C) Propeller shaft (D) Differential

15. The basic characteristics of a brake fluid is

(A) high boiling point (B) Low viscosity (C) Compatibility with rubber and metal parts (D) All of these

16. Caster is a

(A) Forward tilt of the kingpin (B) Backward tilt of the kingpin (C) Either 'A' or 'B' (D) None of these

Q. 17. The "Jominy test" is used to find

a) Young's modulus

b) Hardenability

c) Yield strength

d) Refractoriness

Q.18 When there is no room temperature change, the total shrinkage allowance on a pattern is independent of

    a) Pouring temperature of the liquid metal

    b) Freezing temperature of the liquid metal

    c) The component size

    d) Coefficient of thermal contraction of solidified metal

Q.9 While cooling, a cubical casting of side 40mm undergoes 3%, 4% and 5% volume shrinkage during the liquid state, phase transition and solid state, respectively. The volume of metal compensated from the riser is

    a) 2%

    b) 8%

    c) 7%

    d) 9%

Q.20 A test specimen is stressed slightly beyond the yield point and then unloaded. Its yield strength

    a) Decreases

    b) Increases

    c) Remains same

    d) Become equal to UTS

Q.21 The process of hot extrusion is used to produce

    a) Curtain rods made of aluminium

    b) Steel pipes of domestic water supply

    c) Stainless steel tubes used in furniture

    d) Large size pipes used in city water mains

Q.22 In blanking operation the clearance is provided on

    a) The die

    b) The punch

    c) Both die and punch equally

    d) Neither the punch nor the die

Q.23 In metal cutting with a carbide tool, at the maximum recommended speed, the largest % of heat generated goes to the

    a) Tool

    b) Chip

    c) Work

    d) Tool post

Q.24 In order to have interference fit, it is essential that the lower limit of shaft should be

    a) greater than the upper limit of the hole

    b) lesser than the upper limit of the hole

    c) greater than the lower limit of the hole

    d) lesser than the lower limit of the hole

Q.25 A dummy activity is used in PERT network to describe

    a) Precedence relationship

    b) Necessary time delay

    c) Resource restriction

    d) Resource idleness

Q.26 If the demand for an item is doubled and the ordering cost halved, the economic order quantity

    a) Remains unchanged

    b) Increases by factor of 2

    c) is doubled

    d) is halved

Q.27 Which one of the following is NOT a decision taken during the aggregate production planning stage?

    a) Scheduling of machines

    b) Amount of labor to be committed

    c) Rate at which production should happen

    d) Inventory to be carried forward

Q.28 In a DC arc welding operation, the voltage-arc length characteristic was obtained as V_{arc} = 20 + 5l where the arc length I was varied between 5 mm and 7 mm. Here V_{arc} denotes the arc voltage in Volts. The arc current was varied from 400 A to 500 A. Assuming linear power source characteristic, the open circuit voltage and the short circuit current for the welding operation are

    a) 45 V, 450 A

    b) 75 V, 750 A

    c) 95 V, 950 A

    d) 150 V, 1500 A

Q.29 3-2-1 method of location in jig or fixture would collectively restrict the work piece in 'n' degrees of freedom, where the value of 'n' is

    a) 6

    b) 8

    c) 9

    d) 12

Q.30 The total number of decision variables in the objective function of an assignment problem of size n × n (n jobs and n machines) is

    a) n^2

    b) 2n

    c) 2n − 1

    d) n

Q.31 Match the corresponding principle with the instrument

Instrument	Principle of inspection
P. Dial indicator	1. Non-contact
Q. Pneumatic gauge	2. Limit of size
R. GO/NO GO gauge	3. Comparator

	P	Q	R
a)	2	3	1
b)	3	1	2
c)	1	2	3
d)	2	1	3

Q.32 The material most commonly used for manufacturing of machine tool beds is

a) MS

b) Gray CI

c) White CI

d) Galvanized iron

Q.33 If there are m sources and n destinations in a transportation matrix, the total number of basic variables in a basic feasible solution is

a) $m + n$

b) $m + n + 1$

c) $m + n - 1$

d) M

34. The equivalent length of a column fixed at both ends, is

a) 0.5L

b) 0.7L

c) L

d) 2L

35. What is the maximum stress induced in a bar 2500 mm2, when a load of 2000 kN is applied suddenly?

a) 400 N/mm^2

b) 800 N/mm^2

c) 1600 N/mm^2

d) Insufficient data

36. Calculate the torque which a shaft of 300 mm diameter can safely transmit, if the shear stress is 48 N / mm².

a) 356 kNm

b) 254 kNm

c) 332 kNm

d) 564 kNm

37. When the axes of first and last gear are co-axial, then gear train is known as

a) Simple gear train

b) Compound gear train

c) Reverted gear train

d) epicyclic gear train

38. Oldham's coupling is the

a) Second inversion of double slider crank chain

b) Third inversion of double slider crank chain

c) Second inversion of single slider crank chain

d) Third inversion of slider crank chain

39. The engine of an aeroplane rotates in a clockwise direction when seen from the tail end and the aeroplane takes a turn to the left. The effect of the gyroscopic couple on the aeroplane will be

a)   To raise the nose and dip the tail

b) To dip the nose and raise the tail

c) To raise the nose and tail

d) To dip the nose and tail

40. A system has a mass of 0.5 kg and spring stiffness of 2452 N/m. Find the natural frequency of the system.

a) 5.14 Hz

b) 9.14 Hz

c) 11.14 Hz

d) 28.14 Hz

41. Failure of a material is called fatigue when it fails

a) At the elastic limit

b) Below the elastic limit

(c) At the yield point

d) Below the yield point

42. The rivet diameter should be

a) More than plate thickness

b) Less than the plate thickness

c) Equal to the plate thickness

d) Half the plate thickness

43. If contacting surface are 7 then number of disc use in multiplate clutch are

a) 5

b) 6

c) 7

d) 8

44. Critical speed is expressed as _____ .

a) Rotation of the shaft in degrees

b) Rotation of the shaft in radians

c) Rotation of the shaft in minutes

d) The natural frequency of the shaft

45. In universal testing machine, the tensile specimen of mild steel fails in shear and the shear stress is maximum at ------------- degrees planes with respect to the direction of load.

a) 30

b) 45

c) 60

d) 75

46. If two concurrent forces A and B acting on a point are 200 N and 300 N. What is the magnitude of resultant force, if it makes an angle of 50^0 with each force?

a) 471.08 N

b) 455.12 N

c) 400.56 N

d) Insufficient data

47. In a simply supported beam subjected to uniformly distributed load (w) over the entire length (l), total load=W, maximum Bending moment is

a) Wl/8 or wl^2/8 at the mid-point

b) Wl/8 or wl^2/8 at the end

c) Wl/4 or wl^2/4

d) Wl/2

48. A mechanism has 8 links, out of which 5 are binary, 2 are ternary and 1 is quaternary. The number of instantaneous centres of rotation will be

a) 28

b) 56

c) 62

d) 66

49. A ball of mass 1 kg moving with velocity of 2m/s collides directly on a stationary ball of mass 2 kg and comes to rest after impact, the velocity of second ball after impact will be

a) Zero

b) 0.5 m/s

c) 1.0 m/s

d) 2.0 m/s

50. In order to balance the reciprocating masses

(a) Primary and secondary forces must be balancer

(b) Primary couple must be balanced

(c) Secondary couple must be balanced

(d) all of the above

Answer Key of Ph.D. Mechanical Engineering (Part Time)

1.	A		17.	B		34.	A	
2.	B		18.	A		35.	C	
3.	C		19.	C		36.	B	
4.	B		20.	B		37.	C	
5.	B		21.	A		38.	B	
6.	B		22.	B		39.	A	
7.	C		23.	B		40.	C	
8.	C		24.	A		41.	D	
9.	B		25.	A		42.	A	
10.	C		26.	A		43.	D	
11.	B		27.	A		44.	D	
12.	C		28.	C		45.	B	
13.	C		29.	C		46.	A	
14.	C		30.	A		47.	A	
15.	D		31.	B		48.	D	
16.	C		32.	B		49.	C	
			33.	C		50.	D	