CODE: MS

M.Tech. Common Entrance Test, PGCET – 2010

Mechanical Sciences
(AU/ME/IP/IM/MA)

Time: 2 Hours | Max. Marks: 100

Read the following instructions before answering the test

i) Write / darken the particulars of your identity, Test Seat Number and affix your signature on the OMR Response Sheet before the start of the test.

ii) All Questions have multiple choices of answers, of which only one is correct.

iii) Mark the correct answer by completely darkening only one oval against the Question number using Black Ink Ball Point pen only.

iv) There will be no negative evaluation with regard to wrong answers. Marks will not be awarded if multiple answers are given.

v) Do not make any stray mark on the OMR Response sheet. For rough work, use blank page on the Question paper.

vi) Taking the Question paper out of the test hall is permitted only after the full duration of the test.

vii) Use of only non-programmable calculator is permitted.

viii) START ANSWERING ONLY AT THE SPECIFIED TIME WHEN THE INVIGILATOR GIVES INSTRUCTIONS.

MARKS DISTRIBUTION

	PART – A	
Section – I	30 Questions :	30 x 1 = 30 Marks
Section – II	15 Questions :	15 x 2 = 30 Marks
	PART – B	
Section – I	20 Questions :	20 x 1 = 20 Marks
Section – II	10 Questions :	10 x 2 = 20 Marks
		Total = 100 Marks

PART – A
(Common to AU/ME/IP/IM/MA)
SECTION – I of PART – A

Each Question carries One mark **30 × 1 = 30 Marks**

1. If A and B are symmetric matrices, then AB – BA is a
   a) Symmetric matrix
   b) Skew symmetric matrix
   c) Diagonal matrix
   d) Null matrix

2. If $x = r \cos\theta$, then $\left(\frac{\partial x}{\partial r}\right)_\theta$ is equal to
   a) $\cos\theta$ b) $-\cos\theta$ c) $r\sin\theta$ d) $-r\sin\theta$

3. The order of the differential equation of all tangent lines to the parabola $y = x^2$ is
   a) 1 b) 2 c) 3 d) 4

4. The strength is the ability of the material to resist
   a) Deformation under stress
   b) Externally applied forces with breakdown or yielding
   c) Fracture due to high impact loads
   d) None of these.

5. The compressive strength of cast iron is _____ that of its tensile strength.
   a) equal to b) less than c) more than d) half

6. The term 'centroid' is
   a) the same as centre of gravity
   b) the point of suspension
   c) the point of application of the resultant of all the forces tending to cause a body to rotate about a certain axis
   d) none of these

7. In terms of Poisson's ratio (ν), the ratio of Young's modulus (E) to shear modulus (G) of elastic materials is
   a) $2(1+\nu)$ b) $2(1-\nu)$ c) $\frac{1}{2}(1+\nu)$ d) $\frac{1}{2}(1-\nu)$

8. Principal stresses are the stresses acting normal to
   a) a plane
   b) an oblique plane
   c) a principal plane
   d) a plane having minimum shear stress.

9. The expression $EI\frac{d^3y}{dx^3}$ in the standard notations at a section of a member represents
   a) shearing force
   b) rate of loading
   c) bending moment
   d) slope

10. The specific weight of sea water is _____ that of pure water.
    a) same as b) less than c) more than d) double

11. The metacentric height is the distance between the
a) centre of gravity of the floating body and the centre of buoyancy.
b) centre of gravity of the floating body and the metacentre.
c) metacentre and the centre of buoyancy.
d) original centre of buoyancy and the new centre of buoyancy.

12. One poise is equal to
a) 0.1 N-s/m^2 b) 1 N-s/m^2 c) 10 N-s/m^2 d) 100 N-s/m^2

13. Dew point temperature is the temperature at which condensation begins, when the air is cooled at constant
a) volume b) entropy c) pressure d) enthalpy

14. The expansion ratio (r) is equal to

a) $\frac{v_1}{v_2}$ b) $\frac{v_2}{v_1}$ c) $\frac{v_1 + v_2}{v_1}$ d) $\frac{v_1 + v_2}{v_2}$

where v_1 = volume at the beginning of expansion, and
v_2 = volume at the end of expansion.

15. The efficiency of the semidiesel cycle approaches to the efficiency of the Otto cycle when,
a) cut – off is increased b) cut – off is decreased
c) cut – off is zero d) cut – off is constant

16. In a closed cycle gas turbine, the air is compressed
a) isothermally b) isentropically c) polytropically d) none of these

17. For a four-bar linkage in toggle position, the value of mechanical advantage is
a) 0.0 b) 0.5 c) 1.0 d) ∞

18. The number of inversions for a slider crank mechanism is
a) 6 b) 5 c) 4 d) 3

19. The ratio of the height of Porter governor (when the length of the arms and links are equal) to the height of Watt's governor is

a) $\frac{m}{m+M}$ b) $\frac{M}{m+M}$ c) $\frac{m+M}{m}$ d) $\frac{m+M}{M}$

where m = mass of the balls and M = mass of the sleeve.

20. For a spring - mass system shown in fig. Q.20 (i), the frequency of vibration is f_n. When one more similar spring is added in series as shown in fig. Q.20 (ii), the frequency of vibration will be.

a) $\frac{f_n}{\sqrt{2}}$ b) f_n c) $\sqrt{2}\, f_n$ d) $2f_n$

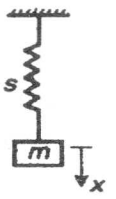

Fig. Q.20 (i)

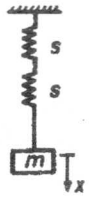

Fig. Q.20 (ii)

21. Endurance limit is the value of maximum stress, which a material can withstand without failure, for infinite number of cycles, when it is subjected to a
    a) dynamic load
    b) static load
    c) bending load
    d) completely reversed load

22. A sunk key is a key
    a) made from a cylindrical disc having a segmental cross-section
    b) which fits half in the key way of the hub and half in the key way of the shaft
    c) which is flat on the shaft and fits in a key way in the hub
    d) none of these

23. The backlash for spur gears depends upon
    a) tooth profile
    b) module
    c) pitch line velocity
    d) both (b) and (c)

24. For an automobile industry, which of the following type of organization is preferred?
    a) functional organization
    b) line organization
    c) line and staff organization
    d) none of these.

25. The mechanism of material removal in EDM process is
    a) melting and evaporation
    b) melting and corrosion
    c) erosion and cavitation
    d) cavitation and evaporation

26. Misrun is a casting defect which occurs due to
    a) very high pouring temperature of the metal
    b) insufficient fluidity of the molten metal
    c) absorption of gases by the liquid metal
    d) improper alignment of the mould flasks

27. The only angle on which the strength of the tool depends, is
    a) clearance angle b) rake angle c) cutting angle d) lip angle

28. The forging of steel specimen is done at a temperature of
    a) 400°C b) 600°C c) 800°C d) 1000°C

29. Work study is used in
    a) industries b) transport c) hospital d) all of these

30. PERT is a
    a) target – oriented technique
    b) time – oriented technique
    c) event – oriented technique
    d) activity – oriented technique

(Common to AU/ME/IP/IM/MA)
SECTION – II of PART – A

Each Question carries Two marks **15 × 2 = 30 Marks**

31. The characteristic equation of the matrix

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix} \text{ is}$$

a) $\lambda^3 + 5\lambda^2 + 7\lambda + 3 = 0$ b) $\lambda^3 - 5\lambda^2 + 7\lambda + 3 = 0$
c) $\lambda^3 - 5\lambda^2 + 7\lambda - 3 = 0$ d) $\lambda^3 + 5\lambda^2 - 7\lambda - 3 = 0$

32. The value of λ for which the system of equations
$x + y + \lambda z = 4$,
$x - 2y + z + 4 = 0$,
$2x - y - z = 2$, has no solution is
a) - 3 b) - 2 c) 0 d) 3

33. The Laplace transform of $t + t^2 + t^3$ is
a) $\frac{1}{s} + \frac{2}{s^2} + \frac{3}{s^3}$ b) $\frac{1}{s^2} - \frac{2}{s^2} + \frac{3}{s^3}$ c) $\frac{1}{s^2} + \frac{2}{s^3} + \frac{6}{s^3}$ d) $\frac{1}{s^2} - \frac{2}{s^3} - \frac{6}{s^3}$

34. Gun metal, which is used in journal bearings, contains
a) 88% Cu, 10% Sn, 2% Zn b) 80% Cu, 10% Zn, 10% Aℓ
c) 85% Cu, 5% Mg, 10% Aℓ d) 85% Cu, 5% Sn, 10% Pb

35. Bodies 1 and 2 shown in the Fig. Q.35 have equal mass m. All surfaces are smooth. The value of force P required to prevent sliding of body 2 on body 1 is
a) P = 2mg b) P = $\sqrt{2}$ mg c) P = $2\sqrt{2}$ mg d) P = mg

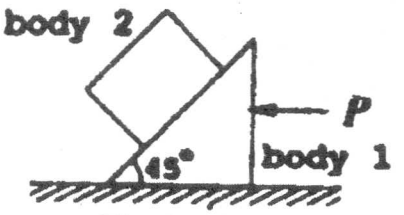

Fig. Q. 35

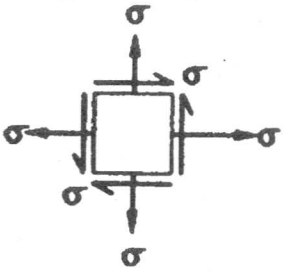

Fig.Q.36

36. The maximum principal stress for the stress state shown in the fig. Q. 36. is
a) σ b) 2 σ c) 3 σ d) 1.5 σ

37. For a fluid flow through a divergent pipe of length L having inlet and outlet radii of R_1 and R_2 respectively and constant flow rate of Q, assuming the velocity to be axial and uniform at any cross-section, the acceleration at the exit is
a) $\frac{2Q(R_1 - R_2)}{\pi LR_2^3}$ b) $\frac{2Q^2(R_1 - R_2)}{\pi LR_2^3}$ c) $\frac{2Q^2(R_1 - R_2)}{\pi^2 LR_2^5}$ d) $\frac{2Q^2(R_2 - R_1)}{\pi^2 LR_2^5}$

38. A venturimeter of 20 mm throat diameter is used to measure the velocity of water in a horizontal pipe of 40 mm diameter. If the pressure difference between the pipe and throat sections is found to be 30 kPa, then, neglecting frictional losses, the flow velocity is

a) 0.2 m/s b) 1.0 m/s c) 1.4 m/s d) 2.0 m/s

39. An engine working on the air standard Otto cycle has a cylinder diameter of 10 cm and stroke length of 15 cm. The ratio of specific heats for air is 1.4. If the clearance volume is 196.3 cc and the heat supplied per kg of air per cycle is 1800 kJ/kg, then work output per cycle per kg of air is

a) 879.1 kJ b) 890.2 kJ c) 895.3 kJ d) 973.5 kJ

40. A single-acting two-stage compressor, with complete intercooling, delivers air at 16 bar. Assuming an intake state of 1 bar at 15°C, the pressure ratio per stage is

a) 16 b) 8 c) 4 d) 2

41. A vibratory system consists of a mass 12.5 kg, a spring of stiffness 1000 N/m, and a dashpot with damping coefficient of 15 Ns/m. The value of critical damping of the system is

a) 0.223 Ns/m b) 17.88 Ns/m c) 71.4 Ns/m d) 223.6 Ns/m

42. If a solid shaft can resist a bending moment of 3.0 kNm and a twisting moment of 4.0 kNm together, then the maximum torque that can be applied is

a) 7.0 kNm b) 3.5 kNm c) 4.5 kNm d) 5.0 kNm

43. In an orthogonal cutting test on mild steel, the following data were obtained.

Cutting speed	: 40 m/min
Depth of cut	: 0.3 mm
Tool rake angle	: + 5°
Chip thickness	: 1.5 mm
Cutting force	: 900 N
Thrust force	: 450 N

Using Merchant's analysis, the friction angle during the machining will be

a) 26.6° b) 31.5° c) 45° d) 63.4°

44. Resistance spot welding is performed on two plates of 1.5 mm thickness with 6 mm diameter electrode, using 15000 A current for a time duration of 0.25 seconds. Assuming the interface resistance to be 0.0001 Ω, the heat generated to form the weld is

a) 5625 W-sec b) 8437 W-sec c) 22500 W-sec d) 33750 W-sec

45. A project consists of activities A to M as shown in the Fig.Q.45, with the duration of the activities marked in days.

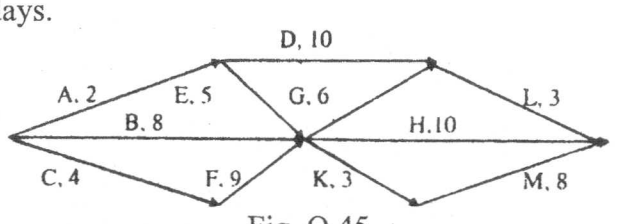

Fig. Q.45

The project can be completed between

a) 18 and 19 days b) 20 and 22 days
c) 24 and 26 days d) 60 and 70 days

NOTE: PLEASE CHOOSE TO ANSWER PART – B BELOW CORRESPONDING TO YOUR BASIC DEGREE

PART – B
(AU: AUTOMOBILE ENGINEERING)
SECTION – I OF PART – B

Each question carries One mark **20 × 1 = 20 Marks**

46. For petrol engines the method of governing is

a) Hit and miss governing
b) Quality governing
c) Quantity governing
d) None of these

47. D-MPFI system uses

a) Port injection b) Direct injection c) Manifold injection d) Throttle body injection

48. The carburetor provides the correct quality of air-fuel mixture during

a) Starting b) Idling c) Acceleration d) All conditions

49. Increase of torque in a vehicle is obtained by

a) Decreasing speed
b) Decreasing power
c) Decreasing petrol consumption
d) All of these

50. The function of a universal joint is to allow the propeller shaft to

a) Change length
b) Bend sideways
c) Transfer torque at an angle
d) Change inclination

51. Hypoid gears require special lubrication because

a) Teeth are made of soft material
b) Teeth are made of hard material
c) Such gears rotate faster
d) There is sliding action between the teeth.

52. The fan in a car is controlled

a) Electrically b) Mechanically c) Hydraulically d) Magnetically

53. The widely used steel for the motor car crankshaft is

a) Nickel steel b) Chrome steel c) Nickel-chrome steel d) Silicon steel

54. If d_i and d_o are the inner and outer diameters of a hollow shaft, then its polar moment of inertia is

a) $\pi\{(do^2)-(di^2)\} \,/\, 32$ b) $\pi\{(do^4)-(di^4)\} \,/\, 32$

c) $\pi\{(do^3)-(di^3)\} \,/\, 32$ d) $\pi\{(do\ )-(di\ )\} \,/\, 32$

55. Which of the following alternator parts convert alternating current into direct current?

a) Rotor b) Stator c) Diodes d) Pulley

56. If the spark plug heat range is too less, what could happen?

a) Fouling b) Pre-ignition c) Detonation d) Weak spark

57. Whirling speed of a shaft coincides with the natural frequency of the

a) Longitudinal vibration
b) Transverse vibration
c) Torsional vibration
d) Both b and c

58. Critical damping is a function of

a) Mass and stiffness
b) Mass and damping coefficient
c) Stiffness and natural frequency
d) Natural frequency and damping coefficient

59. The amplitude of under damping in a small damping varies with time

a) Linearly b) Arithmetically c) Geometrically d) Exponentially

60. A bore of 14.67mm in a work piece can be measured by

a) Steel rule b) Vernier calipers c) Pneumatic gauge d) Micrometer

61. The fit on a hole-shaft system is specified as H7-S6. The type of fit is

a) Clearance fit
b) Running fit (sliding fit)
c) Push fit (transition fit)
d) Force fit (interference fit)

62. Plug gauges are used to

a) Measure the diameter of the work piece
b) Measure the diameter of the holes in the work piece
c) Check the diameter of the holes in the work piece
d) Check the length of holes in the work piece

63. Which of the following is not considered a method of input control in a CAD System?

a) Programmable function box
b) Joy stick
c) Plotter
d) Touch terminal

64. High speed devices in which deflection circuits trace a fixed pattern of parallel lines on the screen are

a) Vector CRTs b) Raster displays c) Display controllers d) Plotters

65. Technical features of a robot are

a) Work volume b) Precision of movement c) Speed of movement
d) All of these

(AU : AUTOMOBILE ENGINEERING)
SECTION – II OF PART – B

Each question carries Two marks **10 × 2 = 20 Marks**

66. An IC engine has a bore and stroke of 2 units each. The area to calculate heat loss can be taken as

a) 4π b) 5π c) 6π d) 8π

67. A centrifugal clutch is to transmit 25.8 kw at 750 rpm when engaged at 75 percent of the running speed. The inside diameter is 0.36 m and radial distance of the centre of gravity of each shoe from the shaft is 0.15 m. Assuming $\mu = 0.3$, the necessary weight of each shoe of the above clutch is

a) 26.91 N b) 28.91 N c) 36.91 N d) 46.91

68. In a gear box the clutch shaft pinion has 14 teeth and the low gear main shaft pinion 32 teeth. The corresponding lay shaft pinions have 36 and 18 teeth. The rear axle ratio is 3.7:1. What is the overall gear ratio?

a) 15.92:1 b) 16.92:1 c) 17.92:1 d) 18.92:1

69. An engine develops 29.5KW at 2000 rpm when the torque is maximum, the bottom gear ratio is 3:1 and the back axle reduction ratio is 4.5:1. What is the torque transmitted by the axle?

a) 1902 N-m b) 2902 N-m c) 3902 N-m d) 4902 N-m

70. A cylinder of 155mm is to be reduced 150mm diameter in one turning cut with a feed of 0.15mm per revolution and a cutting speed of 150m per minute on a NC lathe. What is the programmed spindle speed?

a) 268 rpm b) 288 rpm c) 308 rpm d) 328 rpm

71. A shaft has two heavy motors mounted on it.The transverse natural frequencies, considering each rotor separately are 100 cycles/sec and 200 cycles/sec respectively. The lowest critical speed is
a) 5367rpm b) 6000 rpm c) 9360rpm d) 12,000 rpm

72. A simple spring-mass vibrating system has a natural frequency of N. If the spring stiffness is halved and the mass is doubled, then the natural frequency will become

a) N/2 b) 2N c) 4N d) 8N

73. Suppose X is a normal random variable with mean 0 and variance 4. Then the mean of the absolute value of X is

a) $\frac{1}{\sqrt{2\pi}}$ b) $\frac{2\sqrt{2}}{\sqrt{\pi}}$ c) $\frac{2\sqrt{2}}{\pi}$ d) $\frac{2}{\sqrt{\pi}}$

74. An Otto cycle petrol engine has cylinder diameter 10 cm and stroke 16 cm. Clearance volume is 250 c.c. and $\gamma = 1.4$. The air standard efficiency of the engine is

a) 49.5% b) 51.25% c) 50.6% d) 52.5%

75. In an NC machining operation the tool has to be moved from point (5,4) to point (7,2) along a circular path with centre at (5,2). Before starting the operation, the tool is at (5, 4). The correct G and M code for this motion is

a) N010 G03 X7.0 Y 2.0 15.0 J.0
b) N010 G02 X7.0 Y 2.0 15.0 J.0
c) N010 G01 X7.0 Y 2.0 15.0 J.0
d) N010 G00 X7.0 Y 2.0 15.0 J.0

* * * **WISH YOU GOODLUCK** * * *

PART – B
(ME : Mechanical Engineering)
SECTION – I OF PART B

Each Question carries one mark **20×1 = 20 Marks**

46. According to Newton's law of cooling, the heat from a hot body to a cold body is
(a) Directly proportional to the surface area
(b) Directly proportional to the difference of temperatures between the two bodies
(c) Both (a) and (b)
(d) Either (a) or (b)

47. The heat transfer takes place according to
(a) Zeroth law of thermodynamics
(b) First law of thermodynamics
(c) Second law of thermodynamics....
(d) Kirchhoff's law

48. The process of heat transfer from one particle of the body to another is called conduction, when the particle of the body
(a) Moves actually
(b) Does not move actually....
(c) Vibrates
(d) Does not affect the intervening medium

49. The use of heat exchangers is
(a) Radiators in automobiles
(b) Intercoolers and preheaters
(c) Condensers and evaporators in refrigeration and air conditioning units
(d) All of these

50. Tolerances are specified
(a) To obtain desired fits
(b) Because it is not possible to manufacture in exact sizes
(c) To obtain high accuracy
(d) To have proper allowance

51. Sensitivity and range of a measuring instrument have
(a) Direct relationship
(b) Linear relationship
(c) Inverse relationship
(d) None of these

52. Accuracy of setting a sine bar
(a) Decreases appreciably with steep angle
(b) Is poor for small angles
(c) Is maximum when angle of measurement is 45^{o}
(d) None of these

53. Systematic errors are
(a) Randomly operated
(b) Regularly repetitive in nature
(c) Distributed on both + ve and – ve sides of mean value
(d) Unpredictable

54. The mathematical technique for finding the best use of limited resources in an optimum manner is called
(a) Operations research
(b) Linear programming
(c) Network analysis
(d) Queuing theory

55. The linear programming is applied successfully to the industries like
(a) Iron and steel
(b) Food processing
(c) Oil and chemical
(d) All of these

56. Method used to generate Pseudo- random numbers is
(a) Mid- square method
(b) Additive congruence method
(c) Multiplicative congruence
(d) All of these

57. In PERT network, duration activities only are considered, so as to follow
(a) Normal distribution
(b) Beta distribution
(c) Linear distribution
(d) None of these

58. Sum of buffer stock, reserve stock and safety stock is equal to
(a) Reorder point
(b) Order quantity
(c) EOQ
(d) Maximum inventory level

59. The steps followed for the development of a linear programming model are
1. State the problem in the form of linear programming model
2. Determine the decision variables
3. Write the objective functions
4. Develop equations for the constraints

The correct order is:
(a) 1,2,3,4 (b) 2,1,3,4 (c) 4,1,2,3 (d) 4,3,2,1

60. CAE and CAM are linked through
(a) Common database and communications system
(b) NC programming and automated design
(c) Assembly automation and tool production
(d) Parts production and testing

61. CAPP system based on Group Technology approach is known as
(a) Generative approach (b) Intelligent approach
(c) Variant approach (d) Feature based approach

62. The type of physical configuration of SCARA Robot is:
(a) Polar (b) Cylindrical (c) Cartesian (d) Jointed arm

63. Pyroelectric transducers are concerned with
(a) Temperature dependent electrical polarization
(b) Pressure dependent electrical polarization
(c) Displacement dependent electrical polarization
(d) None of the above

64. Which of the following controller types is most accurate?
(a) Proportional (b) Proportional plus integral
(c) Proportional plus derivative (d) Three mode

65. The APT (Automatically Programmed Tools) language is used for
(a) Drafting systems (b) NC machines
(c) Programmable controllers (d) Large automation systems

ME : Mechanical Engineering
Section – II of Part B

Each Question carries Two marks **10 × 2 = 20 Marks**

66. A furnace wall of thickness 1 m and of surface area 2 m^2, is made of a material whose thermal conductivity is 1 kJ/hr m^0C. The temperature of inner surface of the wall is 1000^0C and of outer surface is 200^0C. Heat flow through the wall in kJ/hr will be
(a) 2000 (b) 1600 (c) 1200 (d) 800

67. Three metal walls of the same cross-sectional area having thermal conductivities in the ratio 1 : 2 : 4 transfer heat at the rate of 6000 kJ/hr. For the same wall thickness, the temperature drops will be in the ratio
(a) 1 : 2 : 4 (b) 1 : ½ : ¼ (c) ¼ : ½ : 1 (d) 1 : 1 : 1

68. If two pumps identical in all respects and each capable of delivering a discharge Q against a head H are connected in parallel, the resulting discharge is
(a) 2 Q against a head 2 H (b) 2 Q against a head H
(c) Q against a head 2 H (d) 2 Q against a head $\sqrt{2}$ H

69. Centrifugal pumps operating in series will result in
(a) higher discharge (b) reduced power consumption
(c) higher head (d) low speed operation

70. The constraints in a given situation are found to be as follows :
$0 \leq x \leq 12$
$0 \leq y \leq 9$
$3x + 6y \leq 66$
The objective function, which is to be maximized is as follows :
$P = 5x + 4y$
The values of x and y are
(a) (11,6) (b) (6,11) (c) (6,6) (d) (11,11)

71. In a transportation problem, there are four supply centers and five demand centers. The total quantity of the supply available is greater than the total demand. The number of allocations, without degeneracy during an iteration is
(a) 3 (b) 6 (c) 9 (d) 0

72. In an assignment model
(a) degeneracy is always present in all the problems
(b) number of resources is equal to number of jobs
(c) only one unit from the i^{th} source can be assigned to any one of its destinations
(d) all of these

73. Drilled holes and honed holes could be designated respectively by the grades
(a) H_5, H_{11} (b) H_6, H_{10} (c) H_8, H_6 (d) H_{10}, H_5

74. Which of the following numbers of grades of fundamental tolerances, and fundamental deviations are specified respectively by IS : 919 on limits and Fits ?
(a) 25, 18 (b) 25, 16 (c) 18, 22 (d) 18, 25

75. The mean and standard deviation of project completion time are 16 days and 2.44 respectively. The probability that the project would be completed in 15 days, will be
(a) 19% (b) 34% (c) 43% (d) 66%

* * * **WISH YOU GOODLUCK** * * *

PART – B
(IP : INDUSTRIAL AND PRODUCTION ENGINEERING)
SECTION – I of PART – B

Each question carries One mark **20 × 1 = 20 Marks**

46. Gauges are designed on the principle of
a) Gilbreth b) Maslow c) Gantt d) Taylor

47. Perthometer is an instrument to measure
a) Velocity b) Temperature c) Pressure d) Surface finish

48. Which of the following is not a contact inspection?
a) Dial indicator b) Machine vision c) Caliper d) CMM

49. Fair game value of a game is
a) Positive or Negative b) Zero c) Positive d) Negative

50. Dial indicator is a type of
a) Pneumatic comparator b) Electrical comparator
c) Mechanical comparator d) Optical comparator

51. The disadvantage of using North – West corner rule to find initial solution to the transportation problem is that
a) It leads to a degenerate initial solution
b) It is complicated to use
c) It does not take into account the cost of transportation
d) All of the above.

52. Quality circle is a work group of _____ employees.
a) 1 - 2 b) 8 - 10 c) 0 d) 25

53. Spherical co-ordinates are also known as
a) Joint arm co-ordinates b) Cartesian co-ordinates
c) Polar co-ordinates d) Cylindrical co-ordinates

54. Universally accepted standard pace for walking in rating is _____ Kmph.
a) 1 b) 4 c) 4.8 d) 2

55. When the process capability is less than the specified tolerance, the rejections are
a) Less b) Very high c) Nil d) High

56. Process of removing internal stresses is called
a) Carburizing b) Tempering c) Annealing d) Nitriding

57. Gilbreth developed a spring driven fast moving clock called microchronometer which is capable of indicating a minimum time value of _____ of a minute.
a) 1/7000 b) 1/8000 c) 1/2000 d) 1/6000

58. Father of scientific management is
a) Fayol b) Maslow c) F.W. Taylor d) Henry Gantt

59. Hot working of metal refers to which of the following temperature relative to the melting point of the given metal on an absolute temperature scale?
a) 0.6 Tm b) Room temperature c) 0.2 Tm d) 0.4 Tm

60. _____ end effectors are used for handling objects like glass
a) Adhesive b) Mechanical c) Suction cup d) Magnetic

61. The cutting force in a blanking operation depends on the following mechanical property of the sheet metal
a) Tensile strength b) Yield strength
c) Compressive strength d) Shear strength

62. Break even quantity can be reduced by
a) Increasing fixed cost b) Increasing selling price
c) Increasing variable cost d) None of these

63. Following is not a metal forming process
a) Milling b) Drawing c) Cupping d) All of these

64. Following is not a Non Destructive Testing method
a) Magnetic particle inspection method b) Ultrasonic testing method
c) Leak test method d) Nick break test method

65. M.S. Sheets are made in large number by
a) Forging b) Milling c) Turning d) Rolling

(IP : INDUSTRIAL AND PRODUCTION ENGINEERING)
SECTION – II of PART – B

Each question carries Two marks **10 × 2 = 20 Marks**

66. The number of non-negative variables in a basic feasible solution to a m × n transportation problem is
a) mn b) m + n c) m + n + 1 d) m + n – 1

67. Curved surface can be machined in numerical control by
a) Bend axis method b) Contour method
c) Point to point method d) Straight line method

68. Surface roughness on a drawing is represented by
a) Circles b) Squares c) Triangles d) Curves

69. A company is engaged in the manufacture of chairs. The cost of land, building and machinery is Rs.1,00,000/-. The cost of wood and labour for each chair is Rs.40/-. And selling price is Rs.60/-. The minimum number of chairs to be manufactured so that neither profit nor loss is incurred is
a) 15000 b) 10,000 c) 5,000 d) 20,000

70. An air conditioner was purchased for Rs.22,000/- and has a life of 10 years. The salvage value is Rs.4000/-. The book value at the end of 8 years, by straight line depreciation method is :
a) Rs.10000/- b) Rs.7600/- c) Rs.9200/- d) Rs.8400/-

71. A Feeler gauge is used to check
a) Radius b) Screw pitch
c) Surface finish d) Clearance

72. Example of Non Destructive testing is
a) 'X' Ray - test b) Compression test c) Tension test d) Bend test

73. Residual method is a type of
a) Radiographic testing b) Leak test
c) Magnetic particle testing d) None of these

74. The cutting speed of a job of 20 mm diameter, rotating at 1000 rpm, in m/min is :
a) 62.8 b) 31.4 c) 100 d) 50

75. Residual stresses in weld cause
a) Stress concentration b) Distortion
c) Martensitic structure d) None of these

* * * **WISH YOU GOODLUCK** * * *

PART – B
(IM: INDUSTRIAL ENGINEERING AND MANAGEMENT)
SECTION-I of PART-B

Each Question carries One mark **20 × 1 = 20 Marks**

46. SIMO charts are used in

a) Method study b)Micro motion study
c) Process analysis d) Layout analysis

47. Gantt chart gives information about

a) Sales b) Scheduling & routing
c) Production schedule d) Machine utilization

48. The theory which states that the average industrial worker dislikes work and wishes to avoid it so as long as he can, is known as McGregor's

a) Theory Z b) Theory Y c) Theory X d) Theory S

49. A system of working known as functional organization was introduced by

a) Newton b) Gantt c) F.W.Taylor d) Gilbreth

50. In a normal distribution curve _____ percent area is included in between $\pm 3\sigma$ limits

a) 99.73 b)37.99 c) 0.27 c) 99.27

51. $\overline{X}$ and R Charts are used for

a) Production control b) Cost control c) Process control d) Material control

52. Most important characteristic of a measuring instrument in general is

a) Precision b) Accuracy c) Repeatability d) Sensitivity

53. According to Taylor's principle, NO GO gauge checks

a) Only one feature at a time
b) Only important dimensions at a time
c) All the dimensions at a time
d) Only the related dimensions at a time

54. Limitation of linear programming models are based on criteria of

a) Additivity b) Divisibility c) Deterministic d) All of these

55. The time which results in the least possible direct cost of an activity is known as

a) Normal time b) Slow time c) crash time d) Standard time

56. CAD/CAM is the inter relationship between

a) Marketing & Design
b) Manufacturing & marketing
c) Engineering & marketing
d) Engineering & Manufacturing

57. Robots are specified by

a) Control system b) Axis of movement c) Payload d) All of these

58. What does the abbreviation DBMS stand for?

a) Database manipulation software
b) Digital base mapping system
c) Data Borrowing & movement software
d) Database Management system

59. A database models data, so that it is

a) Appropriate for application
b) Independent of application program
c) Optimized for most frequent applications
d) Optimized for all applications

60. Information is

a) Data b) Processed data c) Manipulated input d) Computer output

61. For taking decisions data must be

a) Very accurate
b) Massive
c) Collected from diverse sources
d) Processed correctly

62. The Control charts for number of defects per unit is

a) X chart
b) R Chart
c) C chart
d) U Chart

63. The analysis, which depends upon the value of inventory possessed by the firm, rather than what has been consumed or used, is known as :

a) XYZ analysis
b) VED analysis
c) HML analysis
d) FSN analysis

64. Universal surface gauge is used for

a) Checking straightness
b) Checking flatness
c) Checking parallelism
d) Layout work & inspection

65. In a M/M/I queue, with utilization factor of 0.5, the probability of only one person waiting in the queue is

a) 0.125
b) 0
c) 1
d) 1.25

(IM: INDUSTRIAL ENGINEERING AND MANAGEMENT)
SECTION-II of PART-B

Each Question carries Two marks **10 × 2 = 20 Marks**

66. An operator manufactures 75 jobs in 8 hours. If this time includes the time for setting his machine, calculate the operator's efficiency. Standard setting time is 49 mts, and production time per piece is 10 mts.

a) 115.5%
b) 164.6%
d) 184.7%
d) 224.8%

67. A single sampling plan uses a sample size of 15, and an acceptance number of 1; using hypergeometric probabilities, the probability of acceptance of lots of 50 articles with 2% defective is

a) 0.1
b) 1
c)0.98
d)0.01

68. Balls of diameter 30 mm & 15mm were used to measure the taper of a ring gauge. During inspection the ball of 30mm diameter was protruding by 2.5mm above the top surface of the ring. This surface was located at a height of 50mm from the top of the 15mm diameter ball. The taper angle is

a) 19.2°
b)1.92°
c) 29.1°
d) 21°

69. In a point to point NC machine, the slides are positioned by an integrally mounted stepper motor device. If the specification of the motor is 1° per pulse, and the pitch of the lead screw is 3.6mm, the expected positioning accuracy is

a) 1μm b) 10μm c)50μm d)100μm

70. A project requires an initial investment of Rs 5,00,000and returns are of Rs 2,00,000 at the end of each year for 5 years with no terminal salvage. The undiscounted payback period for the project is

a) 2 ½ years b) 3 years c) 2 years d) None of these

71. Pilot study showed the percentage of occurrence of an activity as 50%. The number of observations for 95% confidence level and an accuracy of ±2% is

a) 2500 b) 2000 c) 5000 d) 5200

72. A random sample of 10 is to be taken from a lot of 120 pieces 12 of which are defective. The probability of 3 defectives is

a) 0.184 b) 0.061 c) 0.015 d) 0.001

73. A PERT activity has an optimistic time of 3 days, pessimistic time of 15 days and the expected time is 7 days. The most likely time of the activity is

a) 5 Days b) 6 Days c) 7 Days d) 9 Days

74. The monthly sales is Rs.2000. Annual carrying cost is Rs 2400. The ordering cost per order is Rs. 600. The EOQ is

a) One month sales b) Two month sales c) Three month sales d) Four month sales

75. The arrival is Poisson, with mean rate of 5 units per hour. The service time is exponential with mean rate of 8 units per hour. The service is valued as Rs 150 per hour. The average idle time cost per day of 8 hours will be

a) Rs 250 b) Rs 350 c) Rs 450 d) Rs 500

* * * **WISH YOU GOODLUCK** * * *

PART – B
(MA : Manufacturing Engineering)
SECTION – I of PART – B

Each Question carries One mark **20 x 1 = 20 Marks**

46. Graphical method, simplex method and transportation method are concerned with
a) Value analysis b) Linear programming
c) Break-even analysis d) Queuing theory

47. CPM is the
a) Time oriented technique b) Event oriented technique
c) Activity oriented technique d) Work oriented technique

48. Angle provided in a single point tool to control chip flow is
a) Side rake angle b) Back rake angle c) End relief angle d) Side relief angle

49. Angle formed by the face of the cutting tool and a plane parallel to its base is known as
a) Lip angle b) Clearance angle c) Cutting angle d) Rake angle

50. Parts of circular cross section which are symmetrical about the axis of rotation are made by
a) Hot forging b) Hot piercing c) Hot spinning d) Hot extrusion

51. Cutting and forming operations can be done in single operation on a
a) Simple die b) Progressive die c) Compound die d) Combination die

52. Pre-heating and post-heating is essential in welding
a) Low carbon steel b) Medium carbon steel
c) High carbon steel d) Nickel

53. The ratio between heat liberated at positive and negative poles in arc welding is
a) 1:1 b) 1:2 c) 2:1 d) 2:3

54. CAD/CAM is the inter-relationship between
a) Marketing & design b) Manufacturing and marketing
c) Engineering & marketing d) Engineering & manufacturing

55. The ALU of a computer normally contains a number of high speed storage elements called
a) Semiconductor memory b) Registers
c) Hard disk d) Magnetic disk

56. Memories in which any location can be reached in a fixed and short amount of time after specifying its address is called
a) Sequential-access memory b) Secondary memory
c) Random-access memory d) Mass storage

57. In a turning operation with a single point cemented carbide and steel combination tool having a Taylor exponent of 0.25, if the cutting speed is halved, then the tool life will become
a) Half b) Two times c) Eight Times d) Sixteen times

58. Process capability of the machine tool is equal to
a) Mean value of component
b) Three times the standard deviation
c) Six times the standard deviation
d) None of these

59. The errors of instruments can be determined by
a) Slip gauges
b) Calibration
c) Optical projector
d) Tool maker's microscope

60. If attempts are made to make an instrument very sensitive, the quality which is likely to be impaired is
a) Precision
b) Accuracy
c) Readability
d) Range

61. Optical flats are made of
a) Quartz
b) Glass
c) Plastic
d) Steel

62. The lateral faces of slip gauges are at right angles correct to within
a) ± 1 degree
b) ± 10 minutes
c) ± 30 minutes
d) ± 1 minute

63. The power source which drives the manipulator of a robot is
a) Hydraulic
b) Pneumatic
c) Electric
d) All of these

64. Which of the following tasks intelligent robot can perform?
a) Sense distance between objects
b) Vision capability
c) Adjust grip pressure
d) All of these

65. Process using non-consumable electrode is
a) MIG
b) SAW
c) TIG
d) None of these

(MA : Manufacturing Engineering)

SECTION – II of PART – B

Each Questions carries Two marks **10 × 2 = 20 Marks**

66. The penalty cost is four times that of carrying cost for an item and the demand rate is constant. If shortages are permitted, the service level that could be maintained at EOQ ordering is
a) 0.75
b) 0.80
c) 1.25
d) 1.33

67. In a turning operation the following observations have been made.

Cutting speed (m/min)	Tool –life (min)
30	126
25	310

The Taylorian exponent will be

a) 0.103
b) 0.153
c) 0.203
d) 0.253

68. A washer with 12 mm diameter hole, 1.25 mm thickness and outside diameter 25 mm is to be made from a material whose ultimate shearing strength is 3.8 N/mm^2. The force needed to produce the washer when both the punches operate simultaneously is

a) 402 N b) 452 N c) 502 N d) 552 N

69. In spot welding, the electrode tip diameter (d) should be equal to

a) $\sqrt{t}$ b) 1.5 t c) 3 t d) 4.5 t

(where t is thickness of the plates to be welded).

70. For grade IT 7, value of tolerance is equal to

a) 8 i b) 10 i c) 16 i d) 24 i

71. During an orthogonal machining operation on mild steel, the results obtained are, chip thickness = 0.75 mm; cutting force (F_c) = 950 N; thrust force (F_t) = 475 N. Rake angle of the tool = 0° and uncut chip thickness = 0.25 mm. The co-efficient of friction between the tool and chip is

a) $\frac{1}{\sqrt{2}}$ b) 2 c) $\frac{1}{2}$ d) $\sqrt{2}$

72. For obtaining a cup of diameter 25 mm and height 15 mm by drawing, size of the round blank should be approximately

a) 42 mm b) 44 mm c) 46 mm d) 48 mm

73. The supply at three sources is 50, 40 and 60 units respectively. The demand at the four destinations is 20, 30, 10 and 50 units. In solving this transportation problem

a) A dummy source of capacity 40 units is needed
b) A dummy destination of capacity 40 units is needed
c) No solution exists as the problem is infeasible
d) No solution exists as the problem is degenerate

74. In a time series forecasting model, the demand for five time periods was 10, 13, 15, 18 and 22. A linear regression fit resulted in an equation F = 6.9 + 2.9 t, where F is the forecast for period t. The sum of absolute deviations for the five data is

a) 2.2 b) 0.2 c) -1.2 d) 22

75. The standard tolerance limit is equal to

a) 0.45 ($\sqrt[3]{D}$) + 0.001 D b) 0.45 ($\sqrt[4]{D}$) + 0.001 D
c) 0.45 ($\sqrt[3]{D}$) + 0. 01 D d) 0.45 ($\sqrt[4]{D}$) + 0.01 D

* * * **WISH YOU GOODLUCK** * * *