

## PART - B

## ( MC : MECHANICAL ENGINEERING )

## SECTION - I

Each question carries one mark.

20 × 1 = 20

46. Principle of scientific management was given by  
(A) Gilbreth (B) Greet Hotstede  
(C) Elton Mayo (D) Frederick Taylor.
47. The specific speed of a centrifugal compressor is generally  
(A) higher than that of an axial compressor  
(B) less than that of a reciprocating compressor  
(C) independent of the type of compressor, but depends only on the size of the compressor  
(D) more than the specific speed of the reciprocating compressor but less than that of the axial compressor.
48. Kaplan turbine is  
(A) a high head mixed flow turbine (B) a low axial flow turbine  
(C) an outward flow reaction turbine (D) an impulse inward flow turbine.
49. In a gas turbine, hot combustion product with the specific heat  $C_p = 0.98$  kJ/kg K and  $C_v = 0.7538$  kJ/kg K enters the turbine at 20 bar 1500 K and exits at 1 bar. The isentropic efficiency of the turbine is 0.94. Work developed by the turbine per kg of gas flow is  
(A) 689.64 kJ/kg (B) 794.66 kJ/kg  
(C) 1009.72 kJ/kg (D) 1312.00 kJ/kg.
50. Pelton turbine is  
(A) a high head and low discharge turbine  
(B) a medium head and medium discharge turbine  
(C) a low head and medium discharge turbine  
(D) a high head and high discharge turbine.

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**SPACE FOR ROUGH WORK**

[ P.T.O. ]

51. The first algorithm for Linear Programming was given by  
(A) Bellman (B) Dantzig  
(C) Kulm (D) Von Neumann.
52. Auto collimator is used to check  
(A) roughness (B) flatness  
(C) angle (D) automobile balance.
53. In the specification of dimensions and fits,  
(A) allowance is equal to bilateral tolerance  
(B) allowance is equal to unilateral tolerance  
(C) allowance is independent of tolerance  
(D) allowance is equal to the difference between maximum and minimum dimensions specified by the tolerance.
54. Which among the NC operations given below are continuous path operations ?  
Arc welding ( AW ), Milling ( M ), Drilling ( D ), Punching of sheetmetal ( P ), Laser cutting of sheetmetal ( LC ), Spot welding ( SW ).  
(A) AW, LC and M (B) AW, D, LC and M  
(C) D, LC, P and SW (D) D, LC and SW.
55. NC contouring is an example of  
(A) continuous path positioning (B) point-to-point positioning  
(C) absolute positioning (D) incremental positioning.
56. Heat transfer from higher temperature to lower temperature takes place according to  
(A) Fourier law (B) 1st law of thermodynamics  
(C) 2nd law of thermodynamics (D) Zeroth law of thermodynamics.
57. For heat transfer through a single cylindrical shell with convection of the outside, there is a value for the shell radius for a non-zero shell thickness at which the heat flux is maximised. This value is  
(A)  $k/h$  (B)  $h/k$  (C)  $h/r$  (D)  $r/h$ .

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SPACE FOR ROUGH WORK

58. For the same inlet and outlet temperature of hot and cold fluids, the log mean temperature difference ( LMTD ) is
- (A) greater for parallel flow heat exchanger than for counter flow heat exchanger
  - (B) greater for counter flow heat exchanger than for parallel flow heat exchanger
  - (C) same for both parallel flow and counter flow heat exchanger
  - (D) depends on the properties of the fluids.
59. Air flows over a rectangular plate having dimensions  $0.5 \text{ m} \times 0.25 \text{ m}$ . The free stream temperature of the air is  $300^\circ\text{C}$ . At steady state, the plate temperature is  $40^\circ\text{C}$ . If the convective heat transfer coefficient is  $250 \text{ W/m}^2 \text{ K}$ , the heat transfer rate from the air to one side of the plate is
- (A) 8200 W
  - (B) 8250 W
  - (C) 8125 W
  - (D) 8150 W.
60. Maslow's theory of needs is in the order
- (A) physiological, safety, social, esteem, self actualisation
  - (B) safety, social, esteem, self actualisation, physiological
  - (C) social, esteem, physiological, safety, self actualisation
  - (D) esteem, self actualisation, social, safety, physiological.
61. In a control system the output of the controller is given to
- (A) final control element
  - (B) amplifier
  - (C) comparator
  - (D) sensor.
62. In pneumatic control system the control valve used as final control element converts
- (A) pressure signal to electric signal
  - (B) pressure signal to position change
  - (C) electrical signal to pressure signal
  - (D) position change to pressure signal.
63. The most commonly used criteria for measuring forecast error is
- (A) mean absolute deviation
  - (B) ordering cost of raw material
  - (C) mean standard error
  - (D) mean square error.

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SPACE FOR ROUGH WORK

64. Which one of the following forecasting techniques is not suited for making forecasts for planning production schedules in the short range ?
- (A) Moving average (B) Exponential moving average  
(C) Regression analysis (D) Delphi.
65. A dummy activity is used in PERT network to describe
- (A) precedence relationship (B) necessary time delay  
(C) resource restriction (D) resource idleness.

**SECTION - II**

Each question carries *two* marks.

10 × 2 = 20

66. A sphere of diameter 10 mm and emissivity 0.9 is maintained at 80°C inside an oven with a wall temperature of 400°C. What is the net heat transfer rate from the oven walls to the object ?
- (A) 3.04 W (B) 3.2 W  
(C) 3.08 W (D) 3.12 W.
67. The following data pertain to a single stage impulse steam turbine :
- Nozzle angle = 20°, Blade velocity = 200 m/sec,  
Relative steam velocity at entry = 350 m/sec,  
Blade inlet angle = 30°, Blade exit angle = 25°.
- If the blade friction is neglected, the work done per kg of steam is
- (A) 124 kJ (B) 164 kJ  
(C) 169 kJ (D) 174 kJ.
68. A ring gauge is used to measure
- (A) outside diameter but not roundness  
(B) roundness but not outside diameter  
(C) both outside diameter and roundness  
(D) only external threads.

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**SPACE FOR ROUGH WORK**

69. Which type of motor is *not* used in axis or spindle drives of CNC machine tools ?

- (A) Induction motor (B) D.C. servo motor  
(C) Stepper motor (D) Linear servo motor.

70. The properties of mercury at 300 K are

Density =  $13529 \text{ kg/m}^3$ , Specific heat at constant pressure =  $0.1393 \text{ kJ/kg K}$ ,  
Dynamic viscosity =  $0.1523 \times 10^{-2} \text{ N-s/m}^2$  and Thermal conductivity =  $8.540 \text{ W/mK}$ .  
The Prandtl number of the mercury at 300 K is

- (A) 0.0248 (B) 2.48  
(C) 24.8 (D) 248.

71. In a counter flow heat exchanger, for the hot fluid the heat capacity =  $2 \text{ kJ/kg K}$ ,  
Mass flow rate =  $5 \text{ kg/sec}$ , Inlet temperature =  $150^\circ\text{C}$ , Outlet temperature =  $100^\circ\text{C}$ .  
For the cold fluid heat capacity =  $4 \text{ kJ/kg K}$ , Mass flow rate =  $10 \text{ kg/K}$ , Inlet  
temperature =  $20^\circ\text{C}$ . Neglect the heat transfer to the surroundings. The outlet  
temperature of the cold fluid in  $^\circ\text{C}$  is

- (A) 7.5 (B) 32.5  
(C) 45.5 (D) 70.0.

72. The following data pertain to a Pelton turbine.

Head available =  $450 \text{ m}$ , discharge =  $0.3 \text{ m}^3/\text{sec}$ ,

overall efficiency of Pelton turbine =  $0.8$ .

Power produced by the turbine is

- (A) 1080 kW (B) 1060 kW  
(C) 1000 kW (D) 1020 kW.

73. The sales of a product during the last four years were 860, 880, 870 and 890 units.  
The forecast for the fourth year was 876 units. If the forecast for the fifth year, using  
simple exponential smoothing is equal to the forecast using a three period moving  
average, the value of the exponential smoothing constant  $\alpha$  is

- (A)  $\frac{1}{7}$  (B)  $\frac{1}{5}$   
(C)  $\frac{2}{7}$  (D)  $\frac{2}{5}$ .

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SPACE FOR ROUGH WORK

74. The tool of an NC machine has to move along a circular arc from ( 5, 5 ) to ( 10, 10 ) while performing an operation. The centre of the arc is at ( 10, 5 ). Which one of the following NC tool path commands performs the above mentioned operation ?
- (A) N010 G02 X10 Y10 X5 Y5 R5      (B) N010 G03 X10 Y10 X5 Y5 R5  
(C) N010 G01 X5 Y5 X10 Y10 R5      (D) N010 G02 X5 Y5 X10 Y10 R5.
75. An item can be purchased for Rs. 100. The ordering cost Rs. 200 and the inventory carrying cost is 10% of the item cost annum. If the annual demand is 4000 units, then economic order quantity ( in units ) is
- (A) 50                      (B) 100                      (C) 200                      (D) 400.

**PART - B****( IPE : INDUSTRIAL AND PRODUCTION ENGINEERING )****SECTION - I**

Each question carries *one* mark.

20 × 1 = 20

46. Magnetic particle test
- (A) is employed for non-ferrous materials  
(B) is adapted for ferromagnetic materials  
(C) is used to identify defects deep inside the material  
(D) needs a dye to be employed.
47. The process involving the heating of steel above upper critical temperature and then cooling it in a furnace is known as
- (A) tempering                      (B) normalising  
(C) hardening                      (D) annealing.
48. The subdivision of an operation into Therbligs and their analysis is known as
- (A) work study                      (B) time study  
(C) micro motion study                      (D) none of these.

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**SPACE FOR ROUGH WORK**