1) If a complex variable

$$z = \frac{\sqrt{3}}{2} + \frac{i}{2},$$

then z^4 is GATE 2007 PI

a) $2\sqrt{3} + i \cdot 2$ b) $-\frac{1}{2} + i\frac{\sqrt{3}}{2}$ c) $\frac{\sqrt{3}}{2} - i\frac{1}{2}$ d) $\frac{\sqrt{3}}{8} + i\frac{1}{8}$

2) Two cards are drawn at random in succession,with replacement, from a deck of 52 well shuffled cards. Probability of getting both 'Aces' is GATE 2007 PI

a) 1/169 b) 2/169 c) 1/13 d) 2/13

3) The angle(in degrees)between two planar vectors
$\mathbf{a} = \frac{\sqrt{3}}{2}\,i + \frac{1}{2}\,j$ and $\mathbf{b} = -\frac{\sqrt{3}}{2}\,i + \frac{1}{2}\,j$
is GATE 2007 PI

a) 30 b) 60 c) 90 d) 120

4) What is the value of

$$\lim_{x \to \frac{\pi}{4}} \frac{\cos x - \sin x}{x - \frac{\pi}{4}}$$

Fig. 1. fig1

GATE 2007 PI

a) $\sqrt{2}$ b) 0 c) $-\sqrt{2}$ d) Limit does not exist

5) The determinant

$$\begin{vmatrix} 1+b & b & 1 \\ b & 1+b & 1 \\ 1 & 2b & 1 \end{vmatrix}$$

evaluates to GATE 2007 PI

a) 0 b) 2b(b-1) c) 2(1-b)(1+2b) d) 3b(1+b)

6) f(x) =|x| is a function defined for real numbers x.The directional derivative of f at x=o in the direction d=-1 is GATE AI 2025

a) 1 b) 0 c) -1/2 d) -1

7) Whixh one of the following planar mechanisms does NOT provide quick-return motion? GATE 2007 PI

a) Scotch-Yoke
b) Whitworth
c) Off-set slider crank
d) Drag link

8) The geometric tolerance that does NOT a datum for its specification is GATE 2007 PI

a) Concentricity b) Runout c) Perpendicularity d) Flatness

9) Oil in hydraolic cylinder is compressed from an intial volume of 2 m^3 to 1.96 m^3.If the pressure of oil in the cylinder changes from 40 MPa to 80 MPa during compression, the bulk modulus of elasticity of oil is GATE 2007 PI

a) 1000 MPa b) 2000 MPa c) 4000 MPa d) 8000 MPa

10) A component of a material with a modulus of elasticity of 200 MPa and modulus of rigidity 80 MPa experiences an axial strain of 1000. The lateral strain experienced by the component within the elastic limit is GATE 2007 PI

a) 250 b) 400 c) 500 d) 800

11) Which one of the folowing cooling methods is best suited for converting Austetine steel into very fine Pearlite steel? GATE 2007 PI

a) Oil quenching b) Water quenching c) Air cooling d) Furnace cooling

12) Reaming is primarly used for achieving GATE 2007 PI

a) Higher MRR
b) Improved dimensional tolerance
c) Fine surface finish
d) Improved positional tolerance

13) The interpolator in a CNC machine controls GATE 2007 PI

a) Sindle speed b) Coolant flow c) Feed rate d) Tool change

14) Which one of the following instruments is a comparator? GATE 2007 PI

a) Tool Maker's Microscope
b) GO/NO GO gage
c) Optical Interferometer
d) Dial Gauge

15) Which one of the following is a indispensable part of just-in-Time manufacturing of multiple products on a line? GATE 2007 PI

a) Outbiund quality inspection
b) Lot sizing
c) Safety stocks
d) Set up time reduction

16) During an economic analysis of a capital investment proposal, the cost that can be ignored is GATE 2007 PI

a) Sunk cost b) Fixed cost c) Marginal cost d) Variable cost

17) Which one of the following is an effective therblig? GATE 2007 PI

a) Position b) Inspect c) Grasp d) Search

18) In queueing models, M/M/c denotes a Poisson arrival process and GATE 2007 PI

a) exponentially distributed service times and c servers in series
b) constant service times and c servers in series
c) exponentially distributed service times and c servers in parallel
d) exponentially distributed service times and c servers in parallel

19) A product is made by mixing three raw materials 1 , 2, 3 in varying proportions, where material I must account for not more than 50% of the total.If x,y and z are the amounts of raw materials 1,2,3 respectively,this constant can be modeled as GATE 2007 PI

a) $x \leq 0.5$ b) $x \leq 0.5(x + y + z)$ c) $0.5x \leq x + y + z$ d) $x \geq 0.5(y + z)$

20) Which one of the following cost components is a part of appraisal costs related to quality GATE 2007 PI

a) Quality planning and engineering cost
b) Process control cost
c) Quality data acquisition and analysis cost
d) Product inspection and testing cost

Q. 21 to Q. 75 carry two marks each.

21) If X is a continuous random variable whose probability density function is given by

$$f(x) = \begin{cases} K(5x - 2x^2), & 0 \leq x \leq 2, \\ 0, & \text{otherwise.} \end{cases}$$

Then P(X¿1) is
is GATE 2007 PI

a) 3/14 b) 4/5 c) 14/17 d) 17/28

22) The random variable X takes on the values 1 , 2, or 3 with probabilities (2+5P)/5,(1+3P)/5, and (1.5+2P)/5,respectively.The values of P and E[X] are respectively GATE 2007 PI

a) 0.05,1.87 b) 1.90,5.87 c) 0.05,1.10 d) 0.25,1.40

23) If A is square symmetric real valued matrix of dimension 2n. the eigensalues of A are GATE 2007 PI

a) 2n distinct real values
b) 2n real values, not necessarily distinct
c) n distinctpairs of complex conjugate numbers
d) n pairs of complex conjugate numbers. not necessarily distinct

24) The function e^x over the interval [0,1] is to be evaluated using the Taylor series 1+x+$\frac{x^2}{2!}+\frac{x^3}{3!}$+... to accuracy of $\delta > 0$.The number of terms in the series that is considered for this accuracy is n. Then

GATE 2007 PI

a) for a given $x \in [0,1]$ and a given δ, there is no finite n that is valid
b) for a given $\delta > 0$, there is a valid n that is finite for a given $x \in [0,1]$, but there is no finite n that is valid for all $x \in [0,1]$
c) for a given $\delta > 0$,there is a finite n that is valid for all $x \in [0,1]$
d) there is a finite n that is valid for all x in [0,1] an all $\delta > 0$

25) for the function f(x,y)=x^2 -y^2 defined as R^2 ,The point [0,0] is GATE 2007 PI

a) a local minimum
b) a local maximum
c) neither a local minimum nor a local maximum
d) both a local maximum and a local minimum

26) q_1,.....q_m are n-dimensional vectors , with $m < n$. This set of vectors is linearly dependent. Q is the matrix with q_1,.....q_m as the columns. The rank of Q is GATE 2007 PI

a) Less than m
b) m
c) between m and n
d) n

27) "Matching Exercise". Choose the correct one out of the alternatives A,B,C,D

Group 1	Group 2
P-Second order differential equations	1-Runge-Kutta method
Q-Nonlinear algebraic equations	2-Newton-Raphson method
R-Linear algebraic equations	3-Gauss elimination
S-Numerical integration	4-Simpson's rule

GATE 2007 PI

a) P-3,Q-2,R-4,S-1
b) P-2,Q-4,R-3,S-1
c) P-1,Q-2,R-3,S-4
d) P-1,Q-3,R-2,S-4

28) A disc type flywheel having a mass of 10 kg and radius 0.2 m is replaced in a single cylinder engine by a system of dynamically equivalent concentrated masses m_1 and m_2 rotating about the flywheel axis as shown below. If the distance x_1 is 0.1 m then the distance x_2 is

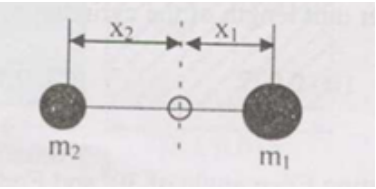

Fig. 2. fig2

GATE 2007 PI

a) 0.1 m
b) 0.2 m
c) 0.4 m
d) 0.8 m

29) A radial disc cam rotating at a constant speed of 60 rpm provides a parabolic displacement of 0.2 m to its fiat faced rectilinear follower during 900 of its rotation. The acceleration (m/s-) experienced by the follower is GATE 2007 PI

a) 0.8 b) 1.6 c) 3.2 d) 6.4

30) Figure below shows a mass of 300 kg being pushed using a cylindrical rod made of a material having E = 22 MPa arid of 2 m length and 0.1 m in diameter. In order to avoid the failure of the rod due to elastic instability, the maximum value of the coefficient of Coulomb friction permissible between the mass and the floor is

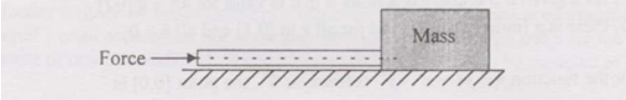

Fig. 3. fig3

GATE 2007 PI

a) 0.22 b) 0.36 c) 0.65 d) 0.75

31) A cylindrical tank is filled with water as shown in the Figure below. The force required to close the discharge tube at the bottom of the tank is

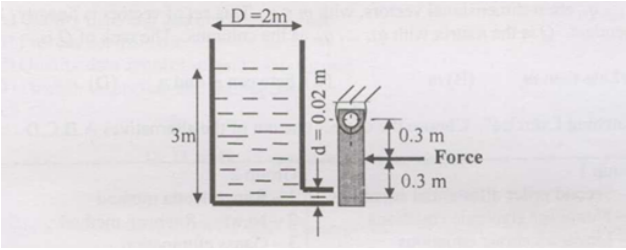

Fig. 4. fig4

GATE 2007 PI

a) 18.5 N b) 37 N c) 45.5 N d) 74 N

32) When an ideal gas (Cp = 3.5) is heated at constant pressure from 25°C to 425°C , the change in entropy is GATE 2007 PI

a) 1.48 b) 2.97 c) 4.2 d) 5.98

33) A long glass cylinder of inner diameter = 0.03 m and outer diameter = 0.05 m carries' hot fluid inside. If the thermal conductivity of glass = 1.05 W/mK, the thermal resistance (°K/W) per unit length of the cylinder is GATE 2007 PI

a) 0.031 b) 0.077 c) 0.17 d) 0.34

34) A tool with Side Cutting Edge angle of 30°C and End Cutting Edge angle of 10°C is used for fine turning with a feed of 1 mm/rev. Neglecting nose radius of the tool, the maximum (peak to valley) height of surface roughness produced will be GATE 2007 PI

a) 0.16 mm b) 0.26 mm c) 0.32 mm d) 0.48 mm

35) Which one of the following process conditions leads to higher MRR in ECM process?
GATE 2007 PI

a) higher current, larger atomic weight
b) higher valency, lower current
c)) lower atomic weight, lower valency
d) higher valency, lower atomic weight

36) In an Abrasive Jet Machining process, if Q = flow rate of the abrasives and d = the mean diameter of the abrasive grain, then material removal rate is proportional to GATE 2007 PI

a) $\frac{Q}{d^2}$ b) Qd c) Qd^2 d) Qd^3

37) "Matching Exercise". Choose the correct one out of the alternatives A, B, C, D

Group 1	Group 2
P-Plastic Carry-Bags	1-Theramal-Vacuum Forming
Q-O-rings	2-Blow Molding
R-Shrink Wrappers	3-Compression Molding
s-Automobile Dashboards	4-Resin Transfer Molding

GATE 2007 PI

a) P-2, Q-3, R-1, S-4 b) P-l, Q-2, R-3, S-4 c) P-3, Q-4, R-1, S-2 d) P-2, Q-3. R-4. S-l

38) "Matching Exercise". Choose the correct one out of the alternatives A, B, C, D

Group-1	Group-2
P-Sand Casting	1-Turbine blades
Q-Investment Casting	2-I.C. Engine Pistons
R-Investment Casting	3-Large bells
S-Die Casting	4-Pulleys

GATE 2007 PI

a) P-4, Q-1, R-3, S-2 b) P-2, Q-4. R-3, S-l c) P-3, Q-4, R-l, S-2 d) P -3, Q -2, R-l, S-4

39) Tolerance on the dimension x in the two component assembly shown below is

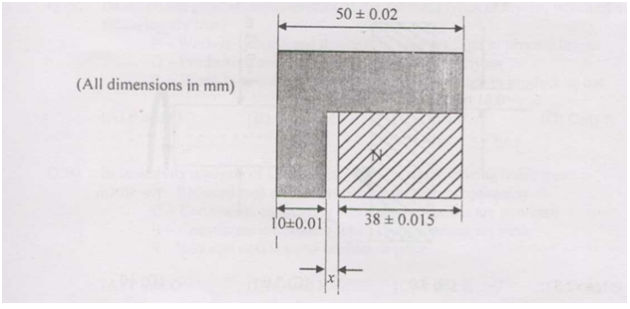

Fig. 5. fig5

GATE 2007 PI

a) ± 0.025 b) ± 0.030 c) ± 0.040 d) ± 0.045

40) The maximum possible percentage reduction in area per pass during wire drawing of an ideal plastic material without friction is of the order of

GATE 2007 PI

a) 37 b) 50 c) 63 d) 75

41) Circular blanks of 35 mm diameter are punched from a steel sheet of 2 mm thickness. If the clearance per side between the punch and die is to be kept as 40 microns, the sizes of punch and die should respectively be

GATE 2007 PI

a) $35^{+0.00}$ and $35^{+0.040}$ b) $35^{-0.040}$ and $35^{-0.080}$ c) $35^{+0.00}$ and $35^{+0.080}$ d) $35^{+0.040}$ and $35^{-0.080}$

42) In a CAD package, a point $P(6, 3, 2)$ is projected along a vector $v(-2, 1, -1)$. The projection of this point on $X - Y$ plane will be GATE 2007 PI

a) (4,4,0) b) (8,2,0) c) (7,4,0) d) (2,5,0)

43) The geometric transformation specified by [X'Y'1] = [X Y 1] $\begin{bmatrix} 0.5 & 0 & 0 \\ 0 & 0.25 & 0 \\ 1 & 2 & 1 \end{bmatrix}$ in a 2D CAD system represents

GATE 20007 PI

a) scaling and Translation
b) Scaling and Rotataion
c) Rotation and Translation
d) Rotation

44) The figure below shows the cross-section of circular fillet weld joining a cylindrical steel pin to a steel plate. If the pin is subjected to a pure torsional load, the shear stress (MPa) occurring at the throat of the weld is

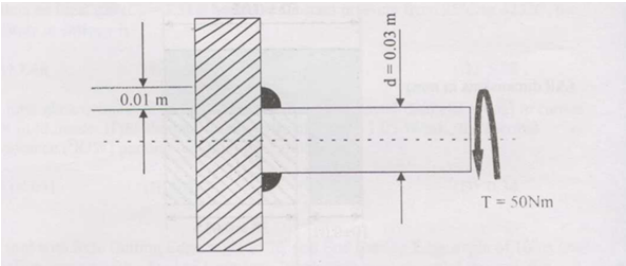

Fig. 6. fig6

a) 2.5 b) 5.0 c) 7.0 d) 10

45) Diameter of a hole after plating needs to be controlled between$30^{+0.050}_{+0.010}$ mm. If the plating thickness varies between 10-15 microns, diameter of the hole before plating should be

GATE 2007 PI

a) $30^{+0.070}_{+0.030}$ mm b) $30^{+0.065}_{+0.020}$ mm c) $30^{+0.080}_{+0.030}$ mm d) $30^{+0.070}_{+0.040}$ mm

46) The D.C. power source for arc welding has the characteristic 3 V + I = 240, where V = Voltage and I = Current in amp. For maximum arc power at the electrode, voltage should be set at

GATE 2007 PI

a) 20 V b) 40 V c) 60 V d) 80 V

47) In a CNC machine feed drive, a stepper motor with step angle of 1.8° drives a lead screw with pitch of 2 mm. The Basic Length Unit (BLU) for this drive iS

GATE 2007 PI

a) 10 microns b) 20 microns c) 40 microns d) 100 microns

48) Which one of the following gear manufacturing processes is NOT based on generation principle?

GATE 2007 PI

a) Gear Hobbing b) Gear Shaping c) Gear Milling d) Gear Shaving

49) Based on the general characteristics of the different types of layout, which of the following are true?
P-Work-in-process and throughput time are high in process layout

Q-Constraints are binding when shadow prices are non-zero

R-Constraints are binding when shadow prices are zero

GATE 2007 PI

a) P and Q b) Q and R c) only P d) only R

50) In sensitivity analysis of LP models, which of the following holds true?
P-Reduced cost of basic variables are zero at optimality

Q-Constraints are binding when shadow prices are non-zero

R-Constraints are binding when shadow prices are zero

S-Reduced cost is same as shadow price

GATE 2007 PI

a) P and Q b) Q and R c) P and R d) Q and S

51) Consider the symmetric dual pair of LPs [P] and [D], where A is an $m \times n$ matrix, b is an m-vector and c is an n-vector.

$$\begin{array}{c|c|c|c} \text{[P] min} & c^T x & \text{[D] max} & b^T y \\ \text{s.t.} & Ax \geq b & \text{s.t.} & A^T y \leq c \\ & x \geq 0 & & y \geq 0 \end{array}$$

Assume that [P] is feasible. If the optimal values are z_1^* for [P] and z_2^* for [D], whenever they exist, then which one of the following is true?

GATE 2007 PI

a) If [D] is infeasible, then z_1^* can be determined and is equal to z_2^*.
b) If [D] is feasible, then z_1^* cannot be determined.
c) If [D] is feasible, then z_1^* can be determined and is equal to z_2^*.
d) If [D] is feasible, then z_1^* can be determined but not equal to z_2^*.

52) The moving average method is to be used for forecasting demand based on m periods of data. Two values of m are tried, m_1 and m_2 with $m_1 > m_2$, to get two different forecasts, denoted by $F(t)$ and $G(t)$. P – $F(t)$ has less variability than $G(t)$
Q – Forecast error of $F(t)$ is less than that of $G(t)$
Which of the above statements are true?

GATE 2007 PI

a) Only P b) Only Q c) Both P and Q d) Neither P nor Q

53) In an optimization problem, let y be a 0-1 variable and x be a positive real number. Now, the condition that x can take non-zero values only ify = 1 can be modeled using the linear constraint

GATE 2007 PI

a) $x \leq My$ (M is a large number)
b) $x \geq y$
c) $x \geq My$ (M is a large number)
d) $xy \geq 0$

54) The average number of accidents occurring monthly on an assembly shop floor is 2. The probability that there will be at least one accident in this month is estimated to be

GATE 2007 PI

a) 0.055 b) 0.456 c) 0.865 d) 0.950

55) $X_1, \ldots, X_{100}$ are Bernoulli random variables with a probability of success equal to 0.6. By the Central Limit Theorem, the random variable

$$Y = \sum_{i=1}^{100} X_i$$

is approximately normally distributed.Then Y has mean and variance respectively equal to ...

GATE 2007 PI

a) 40 and 24 b) 60 and 24 c) 40 and 12 d) 60 and 12

56) Karmarkar's algorithm for Linear Programming

GATE 2007 PI

a) moves along different extreme point solutions of the feasible region
b) enumerates all possible extreme point solutions
c) divides the feasible region into different parts for function evaluation
d) generates interior point iterates which converges to the optimum solution

57) For a transportation problem that has a feasible solution, the northwest corner rule gives a possible solution which is

GATE 2007 PI

a) a basic feasible solution to the problem
b) a near optimal solution to the problem
c) the optimal solution to the problem
d) one of the many optimal solutions to the problem

58) The assignment problem in Linear Programming is also an example of a discrete optimization problem. How many feasible solutions are there to this problem defined on n jobs and n persons?

GATE 2007 PI

a) n^n b) $n(n-1)$ c) n^2 d) $n!$

59) Matching Exercise: Choose the correct one out of the alternatives A, B, C, D

Group 1	Group 2
P – Knowledge Based System	1 – responds to queries with reports
Q – Decision Support System	2 – uses statistical rules of inference
R – Management Information System	3 – provides recommendations
S – Data Mining	4 – uses reasoning techniques

GATE 2007 PI

a) P-4, Q-3, R-1, S-2 b) P-2, Q-3, R-1, S-4 c) P-4, Q-2, R-3, S-1 d) P-3, Q-4, R-1, S-2

60) A process is to be controlled with standard values $\mu = 15$ and $\sigma = 3.6$. The sample size is 9. The control limits for the X chart are

GATE 2007 PI

a) 15 ± 10.8 b) 15 ± 3.6 c) 0.4 ± 10.8 d) 0.4 ± 3.6

61) Item P is made from components Q and R. Item Q, in turn, is made from S and T. The lead times for items P, Q, R, S, and T are 2, 3, 10, 5, and 6 weeks, respectively. The lead time (in weeks) needed to respond to a customer order for item P is

GATE 2007 PI

a) 10 b) 11 c) 12 d) 26

62) The reliability of an equipment for a time to failure exceeding t is given by

$$R(t) = \exp(-\lambda t)$$

The mean time to failure (MTTF) for this equipment (in hours) is GATE 2007 PI

a) λ b) $\frac{1}{\lambda}$ c) $\frac{1}{\lambda^2}$ d) λ^2

63) Four jobs have to be sequenced on a single facility, with the objective of minimizing the maximum tardiness

$$\max_i \left|\text{Completion time}_i - \text{Due date}_i\right|.$$

The jobs have due dates and processing times as follows:

Job	Due date (day number)	Processing time (days)
P	5	2
Q	6	10
R	3	3
S	7	4

The last job that should be taken up is GATE 2007 PI

a) P b) Q c) R d) S

64) An asset investment is made for Rs. 1,20,000. The uniform costs per year are Rs. 40,000 in operating the asset. Uniform benefits per year are either Rs. 60,000 or Rs. 80,000, judged to be equally likely. What is the expected payback period? GATE 2007 PI

a) 3 b) 4.5 c) 6 d) 9

65)

Activity	Time (minutes)
machine loading + unloading	2
machining	4
walking from one machine to the next	1

For the data given above, how many machines can be assigned to an operator to minimize idle time of the operator and machines? GATE 2007 PI

a) 1 b) 2 c) 3 d) 4

66) Given
Assertion [a]: Value engineering of a new product is to be done after the original design concept is nearly ready for release for manufacture.
Reason [r]: Value engineering aims at reducing the cost of manufacture of a new product.
GATE 2007 PI

a) Both [a] and [r] are true and [r] is the correct reason for [a]
b) Both [a] and [r] are true, but [r] is not the correct reason for [a]
c) a is true but [r] is false
d) Both [a] and [r] are false

67) Given
Assertion [a]: There is a continuous reduction of life cycles of modern day products
Reason [r]: Product life cycle management reduces to a large extent the new product development time from concept to production

GATE 2007 PI

a) Both [a] and [r] are true and [r] is the correct reason for [a]
b) Both [a] and [r] are true, but [r] is not the correct reason for [a]
c) Both [a] and [r] are false
a is true but [r] is false

68) The problem of finding the rectangle of maximum area with perimeter equal to 20 can be posed as the constrained optimization problem

$$\begin{aligned} \text{Max} \quad & xy \\ \text{s.t.} \quad & 2x + 2y = 20 \\ & x, y \geq 0 \end{aligned}$$

The solution to this problem is $x = y = 5$. What is the value of the Lagrange multiplier corresponding to the perimeter constraint?

GATE 2007 PI

a) 2.5 b) 5 c) 7.5 d) 10

69) A manufacturing system with a production rate p units/day experiences a demand rate of d units/day where p ¿ d. Let Q be the maximum production quantity per period. When the total production in a period reaches Q units, the production is stopped and restarted only when inventory becomes zero. In such a scenario, the maximum cycle inventory is GATE 2007 PI

a) $Q \cdot p \cdot (p - d)$ b) $\frac{Q}{(p-d)^p}$ c) $\frac{Q}{p}(p - d)$ d) $\frac{p(p-d)}{Q}$

70) In a time study, the observed times and ratings for an elemental operation are as shown below:

	Reading 1	Reading 2
Rating (%)	80	100
Observed time (minutes)	0.60	0.50

Considering an allowance of 10% of the normal time, the standard time (in minutes) for the operation is:

GATE 2007 PI

a) 0.49 b) 0.54 c) 0.98 d) 1.08

Common Data questions

Common Data for questions 71,72,73:

The figure below illustrates a project network describing the precedence relationships among different activities (A-J). The activities along with their duration in weeks are represented as arcs, and the events are shown as nodes (1 is the start event and 9 is the end event).

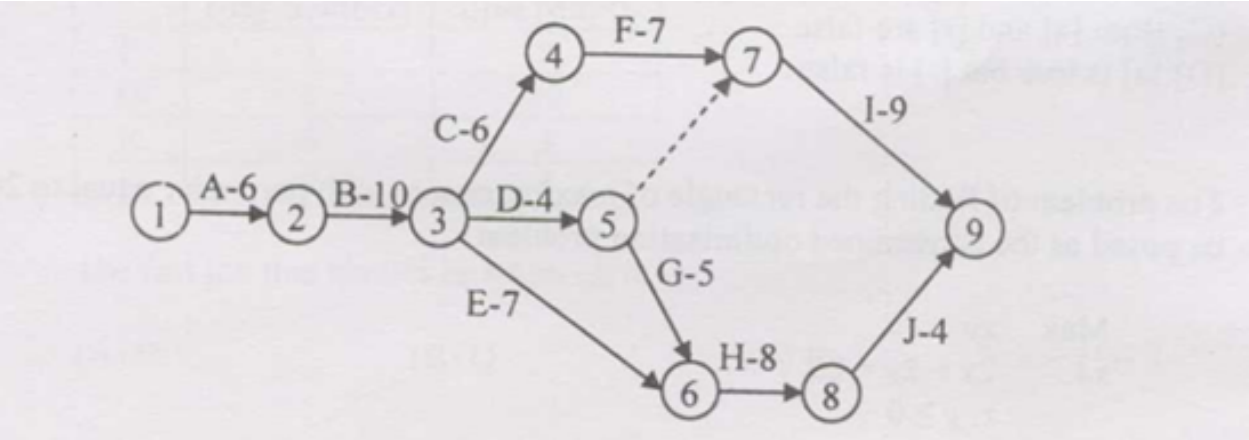

Fig. 7. fig7

71) The length of the crucial path in weeks is GATE 2007 PI

a) 29 b) 31 c) 38 d) 66

72) If U_α is the earliest start time of event α, then the reccurence equation defining U_6 GATE 2007 PI

a) $U_6 = \text{Max}\{U_8, 8\}$
b) $U_6 = U_8 - 8$
c) $U_6 = \text{Max}\{U_3, U_5, 7, 5\}$
d) $U_6 = \text{Max}\{U_3 + 7, U_5 + 5\}$

73) If activity B has uncertain duration and is uniformly distributed over the interval [8, 12], and T is the earliest start time of event 3 (assume that event I starts at time 0), then the mean and variance of T are GATE 2007 PI

a) 10 and 0.4 b) 10 and 1.33 c) 16 and 0.4 d) 16 and 1.33

Common Data for Questions 74,75;
In a Orthogonal machining text, the following observations were made

Cutting force	1200 N
Thrust force	500 N
Tool rake angle	Zero
Cutting speed	1 m/s
Depth of cut	0.8 mm
Chip thickness	1.5 mm

74) Friction angle during machining will be GATE 2007 PI

a) 22.6° b) 32.8° c) 57.1° d) 67.4°

75) Chip speed along the tool rake face will be GATE 2007 PI

a) 0.83 m/s b) 0.53 m/s c) 1.2 m/s d) 1.88 m/s

Statement for Linked Answer Questions 76 & 77:
In the setup shown below, 2 kW power is supplied by oil flowing into the cylinder of the hydraulic actuator at the rate of 400×10^{-6} m^3/s.

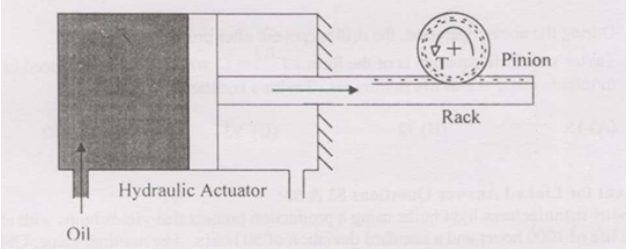

Fig. 8. fig8

76) If the diameter of the piston is 0.05 m, the force (kN) generated on the piston is
GATE 2007 PI

a) 1.6 b) 4.8 c) 9.8 d) 12.2

77) The pinion is a spur gear having 30 teeth of 2mm module. The torque T(Nm)
GATE 2007 PI

a) 1.7 b) 4.0 c) 6.8 d) 8.6

statement for Linked Answer Questions 78 & 79
Consider an unbalanced serial assembly line consisting of three workstations that produces a single part. The part visits each workstation exactly once. The number of parallel machines at each workstation and the processing time at a machine is shown below:

Workstation	Number of machines	Processing time (minutes)
1	1	2
2	2	5
3	6	10

78) What is the capcity (in parts/minute) of the above assembly line?
GATE 2007 PI

a) 0.1 b) 0.4 c) 0.5 d) 0.6

79) The minimum WIP level that allows the line to operate under maximum capacity is
GATE 2007 PI

a) 1.7 b) 4.0 c) 6.8 d) 8.6

statement for Linked Answer Questions 80 & 81

Blind holes 10 mm diameter, 50 mm deep are being drilled in steel block. Drilling spindle speed is 600 rpm, feed 0.2 mm/rev, Point angle of drill is 120°.

80) Machining time (in minutes) per hole will be GTAE 2007 PI

a) 0.08 b) 0.31 c) 0.44 d) 0.86

81) During the above operation, the drill wears out after producing 200 holes. Taylor's tool life equation is ofthe form $VT^{0.3}$ = C, V = cutting speed in miminute and T = tool life in minutes. Taylor's constant C will be GATE 2007 PI

a) 15 b) 72 c) 93 d) 490

Statement for Linked Answer Questions 82 & 83:

A company manufactures light bulbs using a production process that yields bulbs with an average life of 1000 hours and a standard deviation of 50 hours. The nominal value, USL and LSL are 1100 hours, 1300 hours, and 900 hours respectively.

82) The process capability index (C_{pk}) for the manufacturing process is GATE 2007 PI

a) 0.67 b) 1.00 c) 1.33 d) 2.00

83) For the above manufacturing process, the ratio of the potential process capability to its actual process capability is GATE 2007 PI

a) 0.50 b) 0.67 c) 1.00 d) 2.00

Statement for Linked Answer Questions 84 & 85:

In a sand casting process, a sprue of 10 mm base diameter and 250 mm height leads to a runner which fills a cubical mould cavity of 100 mm size

84) The volume flow rate (in mm^3/s) GATE 2007 PI

a) 0.8×10^5 b) 1.1×10^5 c) 1.7×10^5 d) 2.3×10^5

85) The mould filling time (in seconds) is GATE 2007 PI

a) 2.8 b) 5.78 c) 7.54 d) 8.41

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