MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY DABWALI ROAD, BATHINDA
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PET-2017 (Mechanical Engg – Faculty of Engineering)

Roll No: ....

Date.....2 5 JUN 2017

Signature of the Candidate: ....

Q.1. The differential equation
$y'' + (S^3 Sinx)^5 y' + y = Cos\ x^3$ is

(A) Homogeneous

(B) First order and non-linear

(C) Second order and linear

(D) Non-homogeneous with constant co-efficient

Q.2. The number of boundary conditions required to solve the following differential equation

$\dfrac{\partial^2 \phi}{\partial x^2} + \dfrac{\partial^2 \phi}{\partial y^2} = 0$ is/are

(A) 2 (B) 4 (C) 3 (D) 1

Q.3. $\lim\limits_{x \to 0} \dfrac{Sin^2 x}{x}$ is equal to

(A) 0 (B) a

(C) 1 (D) -1

Q.4. If $\phi(x) = \int\limits_{0}^{x^2} \sqrt{t}\,dt, then \dfrac{d\phi}{dx}$ is

(A) $2x^2$ (B) $\sqrt{x}$ (C) 0 (D) 1

Q.5. For what value of Z is the function f(Z) = Cosec Z continuous?

(A) Except at Z = n.π; n is integer

(B) Except at Z = n.(π/2); n is integer

(C) Except at Z = n.(π/4); n is integer

(D) None of these

Q.6. Two numbers are drawn from 1 to 100. The probability that their sum is divisible by 5 is

(A) 13/165 (B) 197/495

(C) 1/5 (D) 14/165

Q.7. The chance that a leap year selected at random will contain 53 Sundays is

(A) 7/2 (B) 2/7 (C) 3/7 (D) 6/7

Q.8. Using trapezoidal rule evaluate $\int\limits_{4}^{5.2} \ln x\,dx$ with using table given below

x:	4.0	4.2	4.4	4.6	4.8	5.0	5.2
lnx:	1.386	1.435	1.482	1.526	1.569	1.609	1.649

(A) 1.8277 (B) 1.9284

(C) 1.6424 (D) 1.9127

Q.9. Evaluate $\int\limits_{0}^{\pi} Sin.dx$ using Simpson's one-third rule, the answer is

(A) 1.9822 (B) 1.9761

(C) 2.1412 (D) 2.0009

Q.10. If $A = \begin{bmatrix} 1 & 3 & 5 \\ 0 & 2 & -1 \\ 0 & 0 & 3 \end{bmatrix}$, then eigen values of the matrix I + A + A² , where I denotes the identity matrix, are

(A) 3, 7, 11

(B) 3, 7, 12

(C) 3, 7, 13

(D) 3, 9, 16

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Q.11 A flywheel of moment of inertia 9.8 kg-m^2 fluctuates by 30 rpm for a fluctuation in energy of 1936 Joules. The mean speed of the flywheel is (in rpm)

(A) 600   (B) 900

(C) 968   (D) 2940

Q.12. The value of velocity and acceleration of piston at near dead centre for a slider-crank mechanism will be

(A) 0, and more than $\omega^2.r$

(B) 0, and less than $\omega^2.r$

(C) 0, 0   (D) ωr , 0

Q.13. Guest's theory of failure is applicable for which of the following type of materials?

(A) Brittle   (B) Ductile

(C) Elastic   (D) Plastic

Q.14. The most efficient riveted joint possible in one which would be as strong in tension, shear and bearing as the original plates to be jointed. But this can never be achieved because

(A) Rivets cannot be made with the same material

(B) Rivets are weak in compression

(C) There should be at least one hole in the plate reducing its strength

(D) Clearance is present between the plate and the rivet

Q.15. In steady flow of a fluid, the acceleration of any fluid particle is

(A) constant   (B) variable

(C) zero   (D) never zero

Q.16. In petrol engines the sparking increases

(A) pressure   (B) volume

(C) temperature of the product of combustion

(D) both (A) and (B)

Q.17. A reversible process

(A) must pass through a continuous series of equilibrium states

(B) leaves no history of the events in surroundings

(C) must pass through the same states on the reversed path as on the forward path

(D) all of the above

Q.18. Which is incorrect statement about results of hot working

(A) Annealing operation is not necessary

(B) Power requirements are low

(C) Surface finish is good

(D) Grain refinement is possible

Q.19. Elasticity of a M.S. specimen is defined by

(A) Hooke's law   (B) Yield point

(C) When plastic flow starts (D) Proof stress

Q.20. Hoop stress in thin walled cylinder is

(A) Compressive stress

(B) Radial stress

(C) Circumferential tensile stress

(D) Longitudinal stress

Q.21. A body of mass 'm' moving with a constant velocity 'v' hits another body of same mass at rest and sticks to it. The velocity of both together will be equal to

(A) v   (B) zero   (C) 2v   (D) v/2

Q.22. For pipe flows, at constant diameter, head is proportional to

(A) Flow (B) (Flow)^2 C) (Flow)^3 (D) (Flow)$^{-1}$

Q.23. Heat conduction does not occur

(A) If a physical body is impermeable to any kind of rays

(B) If the parts of a body are not in motion relative to one another

(C) If the bodies are kept in vacuum

(D) If the temperature of the two bodies are identical

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Q.24. A counter flow heat exchanger is used to heat water from 20^0C to 80^0C by using hot exhaust gas entering at 140^0C and leaving at 80^0C. The log mean temperature difference for the heat exchanger is
(A) 80^0C
(B) 60^0C
(C) 110^0C
(D) Not determinable as zero/zero is involved

Q.25. In Carnot cycle, heat is rejected at constant
(A) Volume
(B) Pressure
(C) Temperature
(D) None of the above

Q.26. A cyclic heat engine does 50kJ of work per cycle. If the efficiency of the heat engine is 75%, the heat rejected per cycle is
(A) $16\dfrac{2}{3}kJ$ (B) $33\dfrac{1}{3}kJ$
(C) $37\dfrac{1}{2}kJ$ (D) $66\dfrac{2}{3}kJ$

Q.27. If the thermal efficiency of an engine becomes 100%, it will violate
(A) Zeroth law of thermodynamics
(B) First law of thermodynamics
(C) Second law of thermodynamics
(D) Third law of thermodynamics

Q.28. 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

Q.29. Half nut mechanism is used for
(A) Turning
(B) Giving feed to the tool
(C) Thread cutting
(D) Maintain gear speed

Q.30. Crater wear occurs mainly due to
(A) Abrasion   (B) Diffusion
(C) Oxidation   (D) Adhesion

Q.31. A sphere of mass 50 kg moving at 3 m/s overtakes and collides with another sphere of mass 25 kg moving at 1.5 m/s in the same direction. What will be the loss of kinetic energy during impact when the impact is inelastic and elastic respectively?
(A) 18.75, 0 N-m   (B) 197.75, 3 N-m
(C) 19.75, 0 N-m   (D) None of these

Q.32 .In sensible cooling process, specific humidity
(A) Increases   (B) Decreases
(C) Remain constant (D) None of these

Q.33. Metal with hexagonal close packed structure is
(A) Silver   (B) Iron
(C) Magnesium   (D) Aluminium

Q.34. Loose piece patterns are
(A) A sort of split patterns
(B) Used when the pattern cannot be drawn from the mould
(C) Similar to core print
(D) Never used in foundry work

Q.35. Blind risers
(A) Assist in feeding the metal into casting proper
(B) Help to trap slag or other lighter particles
(C) Supply the hottest metal when pouring is completed
(D) Do not exist

Q.36. A block of lead 25 mm x 25 mm x 150 mm is pressed between flat dies to a size of 6.25 mm x 100 mm x 150 mm. If the flow stress σ_0 = 7 N/mm^2 and μ = 0.25, then total forging pressure will be given by

(A) 362 kN (B) 462 kN

(C) 562 kN (D) 662 kN

Q.37. The electrodes used in arc welding are coated. This coating is not expected to

(A) Provide protective atmosphere to weld

(B) Stabilize the arc

(C) Add alloying elements

(D) Prevents electrode from contamination

Q.38. For grade IT 7, value of tolerance is equal to

(A) 8 i (B) 10 i

(C) 16 i (D) 24 i

Q.39. The method of classification of items to be adopted for spare parts inventory is

(A) ABC analysis (B) XYZ analysis

(C) VED analysis (D) SDE analysis

Q.40. A dummy activity is used in PERT network to describe

(A) Precedence relationship

(B) Necessary time delay

(C) Resource restriction

(D) Resource idleness