1) सर्व प्रमुखस्थितीवर १५० अनिवार्य प्रश्न आहेत. उमेदवारांनी प्रश्नांतील उत्तरे लिहिश्यास लेखनाल कामयाबी या प्रमुखस्थितीवर सर्व प्रश्न अलग किंवा नाहीत याची खालील करून घ्यावी. अशा तसेच अन्य काही दोष आहजात्यास ही प्रमुखस्थितीका समभागीकोणतें लागू व्यस्त करून घ्यावी.
2) आपला पत्रकार-क्रमांक हा चौकेकाते न वसिसता बालिकेने लिहाव.
3) वर झालेला प्रमुखस्थितीक्रमांक तुमच्या उत्तरपत्रिकेकारी नविनतम या तुमच्या सुचनेमाणे न वसिसता नमुद कराव.
4) (अ) या प्रमुखस्थितीवर प्रश्नात्ल 4 प्रश्नांनी उपरे मुख्यत्त्वात असून त्याच्या 1, 2, 3 आणि 4 असे क्रमांक दिलेले आहेत. त्या प्रश्नांनी सूचनेमाणे सर्व सामान्य उत्तरांचे क्रमांक उत्तरपत्रिकेशीत मूळप्रश्नाने तुमच्या उत्तरपत्रिकेवर नमुद कराव. अशा प्रश्नांना उत्तरपत्रिकेवर उत्तरक्रमांक नमुद कराव ही स्वरूपित प्रक्रिया असते. प्रमुखस्थितीक्रमांक तुमच्या योजनेच्या काळाता काम करून फक्त जाणून घ्यावी काळखाली कामयाबी, हाकातील फक्त निम्नता वा कामयाबी शाळव्या बालिकेने वापरावे, वेबसाइट वा शाळव्या पेन वापरणे नाही.
(ब) याचा विषयावरील विविध माध्यम विनिमय केलेला आहे. त्या विषयावर प्रश्न प्रश्नांनी उपरे मुख्यत्त्वात असून त्याच्या 1, 2, 3 आणि 4 असे क्रमांक दिलेले आहेत. त्या प्रश्नांच्या संपूर्ण जाणकारी त्यांच्या विविध माध्यमातून मिळवू शकता. याच्यासाठी एड्युकेशनल शेअरस्टेट्सच्या सर्वेक्षणातून तलाबार येईल.
5) प्रश्नात्ल 4 मुळप्रश्नांनी उत्तरांची दिलेली आहे. या प्रश्नांनी संपूर्ण माहिती दिलेली आहे. त्यांनी सर्व सामान्य उत्तरांचे क्रमांक उत्तरपत्रिकेशीत मूळप्रश्नाने तुमच्या उत्तरपत्रिकेवर नमुद कराव.
6) उत्तरपत्रिकेच्या एकदा नमुद केलेला उपरे ठोळ देयचा नाही. नजदीक केलेली उपरे ठोळ देणं अशा प्रश्नाने न दिलेले जगाव येईल. त्याप्रमाणे एड्युकेशनल इंटरनेट या प्रश्नाना संपूर्ण जाणकारी दिलेली आहे. त्यांनी सर्व सामान्य उत्तरांचे क्रमांक उत्तरपत्रिकेशीत मूळप्रश्नाने तुमच्या उत्तरपत्रिकेवर नमुद कराव.
7) एड्युकेशनल इंटरनेट या प्रश्नाना संपूर्ण जाणकारी दिलेली आहे. त्यांनी सर्व सामान्य उत्तरांचे क्रमांक उत्तरपत्रिकेशीत मूळप्रश्नाने तुमच्या उत्तरपत्रिकेवर नमुद कराव.
8) प्रस्तुत प्रश्नक्रमांक विशिष्ट केलेल्या विभाग कार्यालय कार्यक्रम (एक वर्तमळ) करावे. प्रस्तुत प्रश्नक्रमांक विभाग तर्फे कार्यालय कार्यक्रमांक देवेशांना केले आहे. तर्फे मान्यता तयार करण्यासाठी व्यवस्थित गर्नार्थ आहे. प्रति वेळी एका व्यक्तीमध्ये कार्यक्रमांक आणणे/किंवा त्यांसोबत एक हजार कमेटी देशात्या प्रमाण पात्र होईल.

9) सदर प्रश्नक्रमांकावर आयोगाने विशिष्ट केलेल्या वेळी संबंधानंतर उमेदवाराची ही प्रस्तुत कार्यक्रमांक स्थळ:वेळेच्या परिस्थितीते बेलेबाचला जणावला घेऊन जणावला प्रवाहाची आहे. मान्यता पत्रकारकांतून जणावल्यासाठी उमेदवारांना आपल्या उत्तरप्रश्नक्रमांक समवेतिकांना विभिन्नता पुढे करणे आवश्यक आहे.

10) प्रस्तुत प्रश्नक्रमांकांतून प्रश्नक्रमांकाच्या कार्यालय आहू आहू आहू, लघुत्रोंच्या उमेदवारांना आधिकारीक (Authentic) स्पष्टीकरण/ संदर्भ देऊन आपले लेखेच निवेदन आयोगात आणावला निर्देशांककडूना स्वतंत्र लघुत्रोंमध्ये उपलब्ध करत आहे. आपल्याकडे सदर पत्रकारकांनी दिनेकपासून 8 वर्षीयसंपूर्ण पत्रकारकांना लेखेच निवेदनाची फक्त दक्षता नेतृत्वाची जाणून जाते. त्याने प्रत्येक पत्रकारकांनी निवेदनाच्या विचारांत खेलांचा ज्ञात नाहीत. त्याने प्रत्येक पत्रकारकांनी निवेदनाबद्दल बोलणाऱ्या पदवीवर त्यांची जाणून जाते नाही.
CODE: SPD

SPACE FOR ROUGH WORK
1. In multistage compression, intercooling is done to
   (1) reduce the volume of air
   (2) minimise the work of compression
   (3) cool the air
   (4) all of the above

2. Refrigeration is based on
   (1) First Law of Thermodynamics
   (2) Second Law of Thermodynamics
   (3) Dalton's law
   (4) Boyle's law

3. In domestic refrigerator, following compressor is used
   (1) Rotary                (2) Reciprocating
   (3) Centrifugal          (4) None of the above

4. Freezing point of Brine is
   (1) below 0° centigrade
   (2) above 0° centigrade
   (3) equal to 0° centigrade
   (4) none of the above

5. Function of thermostat in a domestic refrigerator is to maintain
   (1) Temperature constant
   (2) Pressure constant
   (3) Volume constant
   (4) None of the above

6. Air conditioning is control of
   (1) temperature of air
   (2) relative humidity of air
   (3) temperature, relative humidity and motion of air
   (4) none of the above

7. In comfort air-conditioning, the required comfort conditions are
   (1) 15 °C DBT & 75 % R.H.
   (2) 20 °C DBT & 80 % R.H.
   (3) 15 °C DBT & 35 % R.H.
   (4) 24 °C DBT & 60 % R.H.
8. Human body dissipates heat in the form of
   (1) sensible heat only
   (2) latent heat only
   (3) both sensible and latent heat
   (4) none of the above

9. The method commonly used for dehumidifying air is
   (1) heating
   (2) cooling
   (3) heating and cooling
   (4) to spray steam in the air

10. Refrigerant used in vapour absorption refrigerator is
    (1) Freon-12
    (2) water
    (3) ammonia
    (4) F-11

11. If window air conditioner is kept at the centre of closed room, then temperature of the room will
    (1) increase
    (2) decrease
    (3) not change
    (4) unpredictable

12. In value engineering, the term value refers to
    (1) manufacturing cost of the product
    (2) selling price of the product
    (3) total cost of the product
    (4) utility of the product

13. String diagram is used to
    (1) know the floor space dimensions of a factory
    (2) measure paths of workers/materials/equipments
    (3) measure paths of workers/materials/equipments and their machinery
    (4) trace paths of workers/materials/equipments

14. In a three high rolling mill, the middle roll rotates in a direction _____ to those of the upper and lower rolls.
    (1) same as
    (2) opposite as
    (3) same or opposite
    (4) perpendicular

15. Which of the following is not a locating device?
    (1) Support pin
    (2) Trunnion
    (3) Centraliser
    (4) Cylindrical locator

16. Therbligs refer to the
    (1) activities performed to complete the work in least time
    (2) motions of human body at work place
    (3) recording of the flow of the work
    (4) activities performed to analyse human motions
17. The vector sum of cutting velocity and chip velocity is ________ shear velocity.
   (1) equal to (2) more than (3) less than (4) half of the

18. If 't_o', 't_m', and 't_p' represent optimistic time, most probable time and pessimistic time respectively for a project, then by probability analysis, most probable expected time 't_e' is equal to ________.
   (1) \( \frac{t_o + 4t_m + t_p}{6} \) (2) \( \frac{t_o + 6t_m + t_p}{6} \)
   (3) \( \frac{t_o + 2t_m + t_p}{6} \) (4) \( \frac{2t_o + 4t_m + t_p}{6} \)

19. The surface to be left unmachined is marked on the pattern with ________ colour.
   (1) red (2) yellow (3) blue (4) black

20. In ultrasonic machining, the tool is made of ________.
   (1) tungsten carbide (2) brass or copper
   (3) diamond (4) stainless steel

21. Spacing between two spot welds in spot welding should not be less than ________ where 'd' is the electrode tip diameter.
   (1) d (2) 3d
   (3) 1.5d (4) 6d

22. In work measurement (time) study ________.
   (1) observed time should be taken as standard time
   (2) worker need not be explained reason for study
   (3) any worker may be studied
   (4) the study should not be conducted without correct tools and materials.

23. Slug pulling during piercing and blanking operations can be avoided by providing ________.
   (1) sufficient clearance in holes.
   (2) excessive lubrication.
   (3) spring loaded punch shakers
   (4) perforated punches

24. The rake angle of cutting tool ________.
   (1) controls the chip formation
   (2) prevents rubbing
   (3) determines the profile of the tool
   (4) determines whether the cutting action is oblique or orthogonal
25. The normal time is expressed as
   
   \[
   \frac{\text{observed time} \times \text{performance rating} \%}{100}
   \] 
   
   (1) \text{observed time} \times \text{performance rating} \% / 100 
   
   (2) \text{observed time} + \text{performance rating} \% / 100 
   
   (3) \text{observed time} - \text{performance rating} \% / 100 
   
   (4) \frac{\text{observed time}}{\text{performance rating} \%} \times 100
   

26. A metal hardened by cold working can be softened by a heat treating process known as
   
   (1) carbonizing \hspace{1cm} (2) process annealing
   
   (2) normalising \hspace{1cm} (4) tempering
   

27. Why does a dial gauge need setting when used for linear measurements?
   
   (1) Dial gauge has a zero centred dial scale, hence requires resetting.
   
   (2) Dial gauge has no reference surface, hence setting provides reference for the measurement.
   
   (3) Dial gauge is sensitive, hence needs resetting all the time
   
   (4) None of the above

28. The three sigma limits on control chart for \( X \) are 
   
   (1) \( \bar{X} \pm 3\sigma X \) \hspace{1cm} (2) \( D_4 R \) 
   
   (3) \( \bar{C} \pm 3\sqrt{\bar{C}} \) \hspace{1cm} (4) \( \bar{u} \pm 3\sqrt{\bar{u}/n} \)

29. Comparators are used for
   
   (1) sorting good and incorrect components
   
   (2) measurement in sampling inspection
   
   (3) taking absolute measurement
   
   (4) none of the above

30. Centring of the manufacturing process (tool setting) is revealed by statistical parameter
   
   (1) standard deviation \hspace{1cm} (2) arithmetic average
   
   (3) skewness \hspace{1cm} (4) range of variation

31. 'Constant chord' measurement of gears checks
   
   (1) correctness of tooth profile \hspace{1cm} (2) concentricity of gears
   
   (3) pitch circle diameter \hspace{1cm} (4) tooth thickness at chordal addendum

32. Pneumatic comparators have a very small range of measurement because
   
   (1) it is designed for high magnification
   
   (2) it is highly sensitive
   
   (3) its output has a very short range of linearity
   
   (4) none of the above
33. In foundry, quality control chart used is 
   (1) $\bar{X}$ chart  (2) P chart  
   (3) X chart  (4) C chart

34. A 0 - 25 mm micrometer has smallest main scale division of 0.5 mm and has 50 divisions on thimble. A thimble shows reading of 44 divisions when measuring faces touch each other. This micrometer has read one dimension as 17.28 mm. The correct reading is 
   (1) 17.24 mm  (2) 17.32 mm  
   (3) 17.26 mm  (4) 17.30 mm

35. Flatness of surface plate is assessed using following method or set-up : 
   (1) interferometry  (2) Tool maker's microscope  
   (3) Still water micrometer  (4) Height Vernier

36. In a sampling plan, number of pieces inspected per lot will be 
   ______ as compared to double sampling and multiple sampling plans. 
   (1) greater than  (2) smaller than  
   (3) equal  (4) none of the above

37. In the inspection by attributes 
   (1) variation due to assignable factors are determined  
   (2) good quantities are separated from bad  
   (3) variations due to chance factors are determined  
   (4) theory of probability is applicable

38. $H_7g_6$ (H-seven g-six) gives the following fit : 
   (1) interference fit  (2) Transition fit  
   (3) Precision run fit  (4) Wide clearance fit

39. Wear allowance is provided on 
   (1) 'No Go' gauge  
   (2) Both 'No Go' and 'Go' gauges  
   (3) 'Go' gauge  
   (4) Neither 'Go' nor 'No Go' gauge

40. The OC curve is a graph between 
   (1) percent bad vs. probability of rejection  
   (2) probability of lot vs. probability of defects  
   (3) percent defective vs. probability of acceptance  
   (4) None of the above

41. In alignment test of lathe machine, auto-collimator is used to check 
   (1) true running of spindle  
   (2) pitch error of lead-screw  
   (3) carriage movement parallel to spindle axis  
   (4) flatness of bed
42. If a positive charge 'q' moving with a velocity 'v' through a point in a magnetic field experiences a deflecting force 'F', then the magnetic inductance 'B' at that point will depend on _________.
   (1) only 'q'  
   (2) only 'F'  
   (3) both 'q' and 'F'  
   (4) 'q', 'v' and 'F'

43. A d.c. shunt motor is running at 1000 r.p.m. with no external resistors in its circuit. What may be the place for inserting suitable resistor in order to decrease the speed to 800 r.p.m.?
   (1) across the supply  
   (2) in series with the supply line  
   (3) in series with armature only  
   (4) in series with field only

44. Dynamometer type instruments are used in the measurement of _________.
   (1) D.C. quantity  
   (2) A.C. quantity  
   (3) Single phase A.C.  
   (4) D.C. or A.C. quantity

45. For a load current of 5A, copper losses in a transformer are 25 watts. If the load current is increased to 10A, the copper losses are _________.
   (1) 25 watts  
   (2) 50 watts  
   (3) 100 watts  
   (4) 12.5 watts

46. An overexcited synchronous motor draws _________.
   (1) a lagging current from a.c. source  
   (2) a leading current from a.c. source  
   (3) a unity power factor current from a.c. source  
   (4) a zero current from a.c. source

47. All day efficiency is the performance parameter for
   (1) a distribution transformer  
   (2) a power transformer  
   (3) a pulse transformer  
   (4) all the above transformers

48. A 4 pole, lap wound d.c. generator at a speed of 1000 r.p.m. generates an induced e.m.f. of 250 volts. If the same generator is wave wound and run at 500 r.p.m., the induced e.m.f. of the generator is _________.
   (1) 500 volts  
   (2) 1000 volts  
   (3) 125 volts  
   (4) 250 volts

49. A R-L-C series circuit behaves as a purely resistive circuit at a frequency of 100 Hz. At a frequency of 150 Hz, it will behave as _________.
   (1) resistive  
   (2) resistive and inductive  
   (3) capacitive  
   (4) resistive and capacitive

50. Permeance is a ratio of _________.
   (1) \( \frac{1}{\text{Resistance}} \)  
   (2) \( \frac{1}{\text{Reluctance}} \)  
   (3) \( \frac{\text{Resistance}}{\text{Reluctance}} \)  
   (4) \( \frac{\text{Reluctance}}{\text{Resistance}} \)
51. A d.c. motor draws power from the mains which is essentially controlled by
(1) the load on the motor
(2) the current on full load of the motor
(3) the rated supply voltage
(4) the no-load current of the motor

52. What could be the possible faults if a capacitor-start induction run motor fails to start
when switched on to its proper supply?
(1) open in connection to line
(2) open circuit in motor main
(3) centrifugal switch contacts open
(4) all of (1), (2) and (3) above

53. In a series R-L-C circuit, $R = 5$ ohms, $X_L = 7$ ohms. What should be the value of capacitive
reactance $X_C$, so that the power factor of the circuit be 0.707 lag?
(1) 5 ohms
(2) 2 ohms
(3) 7 ohms
(4) 12 ohms

54. A three phase delta connected a.c. motor connected to a 3-phase, 400 volts, 50 Hz system
is developing 25.6 KW at an efficiency of 80% and a power factor of 0.8. The phase
current in the circuit is ______.
(1) $\frac{100}{\sqrt{3}}$ amp
(2) $\frac{100}{3}$ amp
(3) 64 amp
(4) 100 $\sqrt{3}$ amp

55. A series R-C circuit with $R = 10$ KΩ and $C = 10 \mu$F is allowed to charge during a pulse
width 'T'. For what value of 'T', the waveform across C will show linear characteristic?
Give your choice of correct answer:
(1) $T = 5$ secs
(2) $T = 1$ sec
(3) $T = 0.1$ sec
(4) $T = 0.05$ sec

56. A transformer has iron losses of 'p' watts and full load copper losses of '2p' watts. Which
of the following statements correctly represent 'total losses' in the transformer at half
load?
(1) 3p watts
(2) p watts
(3) $\frac{3p}{4}$ watts
(4) $\frac{3p}{2}$ watts

57. In a UJT saw-tooth time base generator, the frequency of oscillation depends upon
(a) emitter resistance
(b) capacitance connected across emitter and base b2;
(c) Intrinsic stand-off ratio of UJT.
(1) only (a)
(2) only (b)
(3) only (c)
(4) All (a), (b) and (c)
58. For d.c. calculations of the circuit, a reverse-biased diode appears as _______.
   (1) a capacitance  (2) an 'ON' switch  (3) a low resistance  (4) a high resistance

59. For normal working of a transistor _______.
   (a) collector base is reverse biased
   (b) emitter base is forward biased and collector base is reverse biased
   (c) collector base is forward biased, emitter base is forward biased and collector base is reverse biased
   (d) emitter base is always reverse biased

   Answers
   (1) only (d) is true  (2) (c) and (d) are true
   (3) (b), (c) and (d) are true  (4) All four are true

60. Silicon controlled rectifiers are widely used for _______.
   (1) amplification of frequency  (2) power control
   (3) production of oscillations  (4) voltage amplification

61. A pure inductor of 0.1 H is carrying a current of 10 \( \sin(2t) \). What is the voltage drop across the element?
   (1) 1 volt  (2) \( \sin(2t) \) volts
   (3) \( \cos(2t) \) volts  (4) 2 \( \cos(2t) \) volts

62. An output of an LVDT is obtained by connecting the two secondaries _______.
   (1) in parallel and in phase opposition
   (2) in series and in phase opposition
   (3) in series and in same phase condition
   (4) in parallel and in same phase condition

63. JFET is _______.
   (1) current-sensitive device
   (2) voltage-sensitive device
   (3) device that has very low input impedance
   (4) device that has very low amplification factor

64. Consider the following statements A and R.
   **Assertion (A):** The resistance of a photoconductive cell increases when illuminated.
   **Reason (R):** Incident photons of sufficient energy raise valence electrons to conduction band.
   Select your answer from the following alternatives:
   (1) Both A and R are true and R is the true explanation for A.
   (2) Both A and R are true but R is not the true reason for A
   (3) A is true but R is false
   (4) A is false but R is true
65. This $\frac{1}{Z}$ symbol stands for

(1) Diode  (2) Zener diode
(3) Transistor  (4) Rectifier

66. Ripple factor of a power supply is a measure of
(1) its voltage regulation
(2) purity of its output
(3) its filter efficiency
(4) diode rating

67. A resistive load is fed from output of a diode bridge. The load voltage will be closer to d.c. if
(1) series resistor is used
(2) shunt capacitor is used
(3) SCR bridge is used instead of diode bridge
(4) triac is used instead of diode bridge

68. A Zener diode works on the principle of _________.
(1) Zener effect
(2) Hall effect
(3) Avalanche effect
(4) both Zener effect and Avalanche effect

69. A full wave rectifier with a capacitor filter is used to provide the required d.c. voltage. The rectifier circuit is operated using 230 volts/12–0–12 volts transformer. The no-load output voltage is
(1) 12 volts  (2) 16.968 volts
(3) 24 volts  (4) 33.936 volts

70. Through which terminal of FET, majority charge carriers enter?
(1) Channel  (2) Gate
(3) Source  (4) Drain

71. The deflection factor “G” is equal to__________ where S is the sensitivity of CRO, D is the deflection, $E_D$ is the deflection voltage and L is the length of CRO deflection.

(1) $\frac{1}{S}$  (2) $\frac{1}{D}$
(3) $\frac{1}{E_D}$  (4) $\frac{1}{L}$
72. If material expands freely due to heating, it will develop
(1) Thermal stresses (2) Tensile stresses
(3) Compressive stresses (4) No stress

73. The total strain energy stored in a body is termed as
(1) Resilience (2) Proof resilience
(3) Modulus of resilience (4) Toughness

74. According to Euler's theory, the strength of a column against buckling is dependent
upon
(1) Modulus of elasticity (2) Bulk modulus
(3) Cross-section area of column (4) None of the above

75. In a beam at a place where the shear force is maximum, the bending moment will be
(1) maximum
(2) minimum
(3) zero
(4) neither maximum nor minimum

76. A beam is said to be of uniform strength if
(1) Bending moment is same throughout the beam.
(2) Shear stress is same throughout the beam.
(3) Deflection is same throughout the beam.
(4) Bending stress is same at every section along its longitudinal axis.

77. Maximum shear stress in Mohr's circle is
(1) Equal to radius of Mohr’s circle
(2) Greater than radius of Mohr’s circle
(3) Less than radius of Mohr’s circle
(4) None of the above

78. The constant term 'a' for Rankine’s formula is called Rankine’s constant and is given by:
where $f_c =$ yield stress in component
$E = $ Modulus of elasticity

(1) $a = \frac{f_c}{\pi^2 E}$
(2) $a = \frac{f_c}{nk}$
(3) $a = \frac{f_c^2}{\pi E}$
(4) $a = \frac{f_c}{\pi E}$
79. What is the angle between plane of maximum shear with principal plane?
(1) 90°  (2) 45°  
(3) 60°  (4) 0°

80. If a shaft is designed to take combined bending moment (M) and torsion (T), then the equivalent torque will be
(1) \( \sqrt{M^2 + T^2} \)  
(2) \( \frac{1}{2} [M + \sqrt{M^2 + T^2}] \)  
(3) \( \frac{1}{2} \sqrt{M^2 + T^2} \)  
(4) \( M + \sqrt{M^2 + T^2} \)

81. Hoop stress \( \sigma \) in a thin cylinder is given by the formula, where \( D = \) Diameter of cylinder, \( P = \) Load applied, \( t = \) Thickness
(1) \( \sigma = \frac{PD}{2t} \)  
(2) \( \sigma = \frac{PD}{4t} \)  
(3) \( \sigma = \frac{PD}{t} \)  
(4) \( \sigma = \frac{PD}{8t} \)

82. Working of metals at temperature below their re-crystallisation temperature is defined as
(1) Hot working  
(2) Cold working  
(3) Hot spinning  
(4) Cold spinning

83. Hollow cylindrical bodies like water pipes, gun barrels etc., can be manufactured by
(1) Investment casting  
(2) Die casting  
(3) Centrifugal casting  
(4) Shell moulding

84. Split nut in lead screw mechanism of lathe has ________ threads.
(1) Vee  
(2) Square  
(3) Buttress  
(4) Acme

85. Work holding device used for hollow cylindrical bar on lathe is
(1) Chuck  
(2) Arbour  
(3) Mandrel  
(4) Magnetic chuck

86. The main difference between a shaper and a planer is
(1) A shaper is smaller in size  
(2) A shaper is hydraulically operated while a planer is mechanically operated  
(3) Number of cutting tools is more in planer  
(4) Cutting tool is stationary in planer while cutting tool moves in shaper

87. Thermo-plastic material such as cellulose nitrate, polystyrene are cast by
(1) continuous casting  
(2) centrifugal casting  
(3) injection moulding  
(4) die casting

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88. Milling of curved irregular surfaces is possible with
   (1) shaper                     (2) vertical column and knee milling machine
   (3) plane milling             (4) none of the above

89. Shock resisting steel is mainly used for ________
   (1) leaf and coil spring       (2) hammers and chisels
   (3) cranks and piston rods     (4) loco wheels and rails

90. What are the changes of metal dimensions in hot rolling process as the metal passes through the rolls ?
   (1) Reduced in thickness and increased in length
   (2) Reduced in thickness and in length
   (3) Increased in thickness and reduced in length
   (4) Increased in thickness and in length

91. Which process is used to produce tools, gear blanks, crankshafts, connecting rods, gears etc. ?
   (1) Forging                    (2) Smithing
   (3) Swaging                    (4) Fullering

92. Which is the process of removing thick layers of metal by means of Cold Chisel ?
   (1) Cutting                    (2) Sawing
   (3) Chipping                   (4) None of the above

93. Drill size before tapping is derived from the formula ________
    where 'D' is diameter of tap drill size, 'T' is diameter of tap to be used and 'd' is depth of cut
   (1) \[ D = T + 2d \]           (2) \[ D = T - 2d \]
   (3) \[ D = T + 3d \]           (4) \[ D = T - 3d \]

94. What are conditions which tend to promote the formation of built-up edge of cutting tool ?
   (1) Low cutting speed, low rake angle and high speed
   (2) High cutting speed, low rake angle and high speed
   (3) High cutting speed, high rake angle and high feed
   (4) Low cutting speed, high rake angle and low feed

95. Which cutting tool is used for enlarging or finishing a hole previously drilled, bored or cored to give a good finish and an accurate dimension ?
   (1) Parallel shank twist drill  (2) Taper shank core drill
   (3) Reamer                      (4) Multi-tooth twist cutter
96. Precision grinders are those that finish parts to a very accurate dimensions. One of the grinders is
1. Swing frame grinder
2. Abrasive belt grinder
3. Surface grinder
4. Portable and flexible shaft grinder

97. Which is a process that is used to produce geometrically true surface, correct minor surface, imperfections, improve dimensional accuracy or provide a very close fit between two contact surfaces?
1. Honing
2. Polishing
3. Lapping
4. Buffing

98. The purpose of annealing is
1. to refine structure
2. to reduce softness
3. to improve machinability
4. none of the above

99. Choose the wrong statement from the following:
1. The shaper in comparison to planer is easier to operate and about three times quicker in action.
2. In shaper, the metal is removed during forward stroke.
3. The shaper is best suited for cutting keyways and splines on shafts.
4. In case of planer, reciprocating motion is given to the cutting tool.

100. The orthogonal cutting takes place when cutting face of tool is at one of the angles mentioned below to the line of action of tool.
1. $45^\circ$
2. $60^\circ$
3. $90^\circ$
4. $120^\circ$

101. Which one of the following is most suitable to hold the job for drilling hole on the curved surface?
1. Angle plate
2. Table with T-slot
3. Vee-Block
4. None of these

102. A body of weight 1000 N is moved on a horizontal plane having coefficient of friction $\frac{1}{\sqrt{3}}$. The minimum force applied parallel to the horizontal plane to move the body is
1. $1000\sqrt{3}$
2. 1000
3. $\frac{1000}{\sqrt{3}}$
4. 500

103. The efficiency of screw jack
1. depends on load on jack
2. depends on the pitch of the screw threads of the jack
3. depends on both (1) and (2)
4. does not depend combinedly on (1) and (2)
104. A dynamometer fitted on internal combustion engine measures the
(1) brake horse power
(3) indicated horse power
(2) brake torque
(4) indicated torque

105. The size of the cam depends upon
(1) base circle
(3) pitch circle
(2) prime circle
(4) pitch curve

106. The magnitude of 'Coriolis' component of acceleration of sliding block relative to link is

where \( v = \) velocity of sliding block on link
\( \omega = \) angular velocity of link

(1) \( v\omega \)
(2) \( \frac{v\omega}{2} \)
(3) \( 2v\omega \)
(4) \( v\omega^2 \)

107. In an engine mechanism, at what position of crank angle, the angular velocity of connecting rod is zero?
(1) \( 180^\circ \)
(3) \( 45^\circ \)
(2) \( 90^\circ \)
(4) \( 0^\circ \)

108. Contact ratio of spur gear pair is the ratio of
(a) angle of action to pitch angle
(b) length of line of action to base of pitch of teeth
(c) length of line of action to circular pitch of teeth
(d) arc of contact to circular pitch of teeth
Which of these statements are correct?
(1) (a), (b) and (c) are correct
(2) (a), (b) and (d) are correct
(3) (b), (c) and (d) are correct
(4) all are correct

109. The angle between the common tangent to the base circle of gear pair and common tangent to their pitch circle is called as
(1) cone angle
(3) spiral angle
(2) helix angle
(4) pressure angle

110. No force is required for the downward motion of the load on screw jack if
\( (\alpha = \) pitch angle, \( \phi = \) friction angle)
(1) \( \alpha < \phi \)
(3) \( \alpha = 0 \)
(2) \( \alpha > \phi \)
(4) None of the above

111. In case of pivot bearing, the wear is
(1) maximum at the centre of the contact area
(2) zero at the centre of the contact area
(3) uniform throughout the contact area
(4) zero at the maximum radius of the contact area
112. Specific speed of the hydraulic turbine is given by following equation:

\begin{align*}
(1) \quad N_S &= \frac{N \sqrt{P}}{H^{\frac{3}{4}}} \\
(2) \quad N_S &= \frac{N \sqrt{P}}{H} \\
(3) \quad N_S &= \frac{N \sqrt{P}}{H^{\frac{3}{2}}} \\
(4) \quad N_S &= \frac{N \sqrt{P}}{H^2}
\end{align*}

113. Falling drops of rain acquire spherical shape on account of

1. viscosity 
2. surface tension 
3. adhesion and cohesion 
4. compressibility

114. The standard atmospheric pressure of air is

(a) 760 mm of mercury
(b) 1033.625 N/m²
(c) 1.0332 atm
(d) 101325 KN/m²

1. (a) alone is correct
2. (a) and (b) are correct
3. (a), (b) and (c) are correct
4. all are correct

115. The centre of gravity of the volume of the liquid dispersed by an immersed body is called as

1. centre of pressure 
2. meta-centre 
3. centre of buoyancy 
4. centre of gravity

116. Which of the following represents steady uniform flow?

1. Flow through a diverging duct at increasing rate
2. Flow through a diverging duct at any decreasing rate
3. Flow through a long pipe at constant rate
4. Flow through a long pipe at decreasing rate

117. Cavitation in hydraulic turbine results in

1. noise and vibration 
2. reduction of discharge 
3. drop in output and efficiency 
4. all of the above

118. For pumping viscous oil, the pump used is

1. Centrifugal pump 
2. Reciprocating pump 
3. Turbine pump 
4. Screw pump

119. A pump which does not come in category of positive displacement pump is

1. Reciprocating pump 
2. Gear pump 
3. Vane pump 
4. Centrifugal pump
120. The water turbine selected for head varying from 50 m to 150 m is
(1) Bulb turbine  (2) Propeller turbine
(3) Pelton wheel  (4) Francis turbine

121. Airy vessels are provided in reciprocating pump
(1) to store air discharged by pump
(2) to obtain continuous discharge from the pump
(3) to increase the pressure of water
(4) to safeguard the pump

122. Petroleum can be classified as
(1) a renewable form of energy source
(2) a non-renewable form of energy source
(3) a non-conventional form of energy source
(4) none of the above

123. Disadvantage of using solar energy for power production is
(1) energy available in daytime only
(2) initial cost is high
(3) requirement of large area for harnessing solar energy
(4) all of the above

124. Solar cells are made of
(1) Silica  (2) Antimony
(3) Carbon  (4) Steel

125. Which of the following devices can be used to harness solar energy?
(1) Photo-voltaic cell  (2) Wind mill
(3) Gas turbine  (4) Steam turbine

126. When can we have windmill for power?
(1) When high velocity wind (not cyclonic) for long duration of day is available
(2) Cyclonic wind is available
(3) Low velocity wind is constantly available
(4) Movement of air occurs

127. Which one of the following is correct statement?
(1) Latent heat is the heat that does not follow first law of thermodynamics.
(2) Latent heat is the heat that is required to change the substance from solid to gaseous state
(3) Latent heat is the heat that can be detected.
(4) Latent heat is the heat required to change a state of substance from liquid to gaseous state.
128. In steam power plant, thermodynamic cycle used is
   (1) Brayton (2) Rankine
   (3) Carnot (4) Joule

129. Match List-I correctly with List-II and select your answer using the code given below:

   **List-I**                    **List-II**
   (A) Steam Engine             I. Spark plug
   (B) Steam Turbine            II. Eccentric
   (C) Otto cycle Engine        III. Manhole
   (D) Boiler                   IV. Fixed and moving blades

   (A) (B) (C) (D)
   (1) II IV I III
   (2) III II I IV
   (3) IV III II I
   (4) I III IV II

130. The fuel mostly used in Steam Boilers is
   (1) Peat
   (2) Coking bituminous coal
   (3) Non-coking bituminous coal
   (4) Brown coal

131. In a four stroke engine, we get one power stroke in
   (1) 270° of crank rotation
   (2) 360° of crank rotation
   (3) 540° of crank rotation
   (4) 720° of crank rotation

132. Morse test is carried out to determine the I.P. of a
   (1) single cylinder petrol engine
   (2) single cylinder diesel engine
   (3) multi cylinder engine
   (4) double acting steam engine

133. The device for smoothing out the power impulses from the engine is called
   (1) Fly wheel
   (2) Clutch
   (3) Torque convertor
   (4) Differential

134. Which one of the statements is correct?
   (i) Petrol engine is a reciprocating engine
   (ii) Petrol engine is a high speed engine
   (iii) Petrol engine uses petrol as fuel
   (iv) Petrol engine is an internal combustion engine
   (1) All four are correct
   (2) Only (i) is correct
   (3) Only (iv) is correct
   (4) All are wrong
135. To develop high voltage for spark plug of petrol engine:
(1) distributor is installed  (2) carburettor is installed
(3) battery is installed  (4) ignition coil is installed

136. Standard firing order for four cylinder four stroke petrol engine is
(1) 1 - 4 - 3 - 2  (2) 1 - 3 - 4 - 2
(3) 1 - 3 - 2 - 4  (4) 1 - 2 - 3 - 4

137. In compression-ignition four stroke cycle engine, cam shaft runs at
(1) half the speed of crankshaft
(2) same the speed of crankshaft
(3) twice the speed of crankshaft
(4) any speed irrespective of crankshaft speed

138. The actual volume of fresh charge taken into four stroke-petrol engine is
(1) less than stroke volume
(2) equal to stroke volume
(3) equal to stroke volume + clearance volume
(4) does not depend upon stroke volume

139. A two stroke I.C. engine is identified by
________.
(1) the size of the engine  (2) size of the fly wheel
(3) type of cooling system  (4) absence of valves

140. Within a carburettor, the velocity of air is maximum at
________.
(1) outlet
(2) inlet
(3) throat at venturi
(4) central point of total length

141. The diesel engine, is identified by the presence of
________.
(1) air cleaner  (2) radiator
(3) fuel injector  (4) starter

142. In a heat engine, which of the following energy conservation occurs?
(1) Work is converted into heat
(2) Heat energy is converted into electrical energy
(3) Heat energy is converted into work
(4) Electrical energy is converted into heat energy

143. What is thermal efficiency of a heat engine?
(1) It is the ratio of brake power to indicated power
(2) It is the ratio of work output to heat supplied
(3) It is the ratio of heat rejected to heat supplied
(4) It is the ratio of work output to heat rejected
144. Compression ratio of a petrol engine is
   (1) higher than that of diesel engine
   (2) lower than that of diesel engine
   (3) equal to that of diesel engine
   (4) none of the above

145. In a condensing steam engine,
   (1) the pressure in condenser is above atmospheric pressure
   (2) the pressure is below atmospheric pressure
   (3) the pressure is equal to atmospheric pressure
   (4) the complete vacuum exists in condenser

146. With increase in compression ratio, the thermal efficiency of the Otto cycle
   (1) decreases
   (2) does not change
   (3) cannot be predicted unless $\gamma$ (adiabatic index) is known
   (4) increases

147. As the compression ratio increases, the volumetric efficiency of compressor
   (1) decreases
   (2) increases
   (3) remains same
   (4) becomes unpredictable

148. Rotary compressor can supply
   (1) large volumes of air at low pressure
   (2) small volumes of air at high pressure
   (3) large volumes of air at high pressure
   (4) small volumes of air at low pressure

149. Which one of the following is not a safety device on compressor?
   (1) Relief valve
   (2) Over-pressure shut down
   (3) Strainer
   (4) Over-speed shut down

150. The axial flow compressor and centrifugal compressor represent
   (1) positive and non-positive type of rotary compressors respectively.
   (2) positive type compressors.
   (3) non-positive and positive type of rotary compressors respectively.
   (4) non-positive type of compressors.