National Council of Science Museums
(Ministry of Culture, Govt. of India)
Block-GN, Sector-V, Bidhan Nagar
Kolkata – 700 091

Aptitude test for selection of Curator 'B'

Name of the Candidate ....

Form no. ....

Date of Aptitude Test: 02/11/2018
Time: 10:30 A.M.

Total Time: 3 Hours

INSTRUCTIONS FOR THE CANDIDATES

01. Please write your name and form number legibly in the spaces provided;

02. The test contains two sections; viz., **Section-'A'** and **Section-'B'**;

03. The duration of the test is 3 hours for both sections and maximum marks are 100;

04. Read the instructions provided with the questions carefully and answer;

05. In questions having multiple choice answers, please tick legibly on the test paper the answer of your choice;

06. In case you need to change your answer, strike out the wrong one legibly and put a tick in the answer of your choice;

07. If more than one answer is ticked, the answer shall be considered invalid and no marks will be awarded for the answer;

08. Carry out your rough work, if any, on the labeled sheet separately provided with this test paper;

09. No mobile phone will be allowed inside the examination hall;

10. There is no negative marking;

11. The complete question paper with labeled attached sheet should be handed over to the instructor before leaving the room;

12. Candidates will not be allowed to leave the examination hall before 2 hours;

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NATIONAL COUNCIL OF SCIENCE MUSEUMS

(Ministry of Culture, Government of India)   Marks : 30

....

Name of the Candidate: **Form No.:**

....

SECTION - A

Question No. 1 to 30 and carry 1 mark each. Tick the correct answer or fill in the blanks with correct alternatives as may be needed in the question paper.

1. Though many _____ endlessly praised his work, Ramesh often wished for some honest criticism.

    a. sycophants   b. pedants   c. adversaries   d. benefactors

2. The appropriate meaning of the idiom " a dime a dozen" is:

    a. more than sufficient   b. something common
    c. the best one   d. not so common

3. The Mayor was so _____ by the long trial that, despite his eventual acquittal, he admitted his failing health and declined to run for reelection.

    a. distraught   b. exonerated   c. inspired   d. debilitated

4. Most fans dismissed the press release detailing the comedian's ill health as a hoax, as he had frequently _____ his audience by feigning a physical ailment as part of his stage routine.

    a. reconnoitered   b. hoodwinked   c. lambasted   d. vitiated

5. While the egg of any bird will suffice for the tradition of egg decorating, those with _____ shells are preferred, so as to prevent breaking when their contents are hollowed.

    a. Tenuous   b. permeable   c. pristine   d. resilient

6. The _____ group in the adjoining room made it difficult for students taking the mid-term examination to concentrate.

    a. obstreperous   b. quiescent   c. rapacious   d. enervated

7. Fill the sentence with correct alternative:

    He has _____ appreciation of good poetry.

    a. a little   b. the little   c. little   d. none of these

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8. His house is _____ the river Ganges.

    a. beside   b. besides   c. over   d. on

9. Based on the following statements and the conclusions, tick mark the correct answer.

Statements: Some towels are brushes. No brush is soap. All soaps are rats.
Conclusions:
        I.   Some rats are brushes.
        II.   No rat is brush.
        III.   Some towels are soaps.

    a. None follows   b. Only either I or II follows
    c. Only II follows   d. Only II & III follows

10. The population of Uttar Pradesh is greater than _____ State of India.

    a. that of   b. that of any   c. that of any other   d. any other

11. Who has the power to summon and dissolve the Lok Sabha in India?

    a. The Prime Minister of India   b. The Speaker of the Lok Sabha
    c. The President of India   d. The Chief Justice of India

12. As per the constitution of India, the number of nominated members by the President of India to the Rajya Sabha, which has the maximum strength of 250 is

    a. 16   b. 12   c. 18   d. 14

13. An order from a superior court to a lower court or an administrative authority to perform a certain duty is termed as writ of _____.

    a. Mandamus   b. Habeas Corpus   c. Quo warranto   d. Centiorari

14. Noble Prize in Physics 2018 was awarded for groundbreaking work in the field of _____

    a. Plasma Physics   b. Laser Physics
    c. String Theory   d. Thermal Physics

15. The Shanti Swarup Bhatnagar prize in the field of S & T in India awarded by CSIR for notable and outstanding research, applied or fundamental in various disciplines of science was first awarded in the year ......

    a. 1952   b. 1958   c. 1960   d. 1951

16. 'Param-Ishan' supercomputing facility was launched by Union Govt. in which Indian Institute of Technology (IIT)?

    a. IIT Mumbai   b. IIT Indore   c. IIT Guwahati   d. IIT Delhi

17. Total number of states and union territories in India is respectively _____ & _____.

    a. 28 & 8   b. 29 & 8   c. 29 & 7   d. 30 & 6

18. The recent successful launch of PSLV by ISRO in Sept 2018 involving two earth observation satellites of M/s Surrey Satellite Technologies Limited (SSTL), United Kingdom was the _____ mission of ISRO.

    a. PSLV-C40   b. PSLV-C41   c. PSLV-C42   d. PSLV-C43

19. In the recently held Asian Games 2018 in China, India was ranked _____ in the medal's tally.

    a. 6   b. 8   c. 7   d. 9

20. The final book of the renowned physicist and bestselling author Stephen Hawking who died in 2018 is titled _____

    a. The Brief History of Time   b. The Grand Design
    c. Brief Answers to Big Questions   d. The Universe in a Nutshell

21. A certain jar contains 60 coloured glass marbles – 22 white, 18 green, 11 yellow, 5 red, and 4 purple. If a glass marble is to be chosen at random, what is the probability that the glass marble will be neither red nor purple?

    a. 0.09   b. 0.54   c. 0.85   d. 0.91

22. The integers x and y are greater than 1. If (4x)(7y)=756, what is the value of x + y?

    a. 18   b. 12   c. 15   d. 21

23. 18 cups of water by mug A is required to fill a bucket whereas 16 cups of water is sufficient to fill the same bucket by mug B. What is the ratio between volumes of Mug A and Mug B?

    a. 16:9   b. 8:9   c. 9:8   d. 4:6

24. Rohan is taller than Anand but shorter than Seema. Krishnan is taller than Pushpa and shorter than Anand. Dhiraj is taller than Krishnan but shorter than Seema. Who among them is the tallest?

    a. Rohan   b. Anand   c. Dhiraj   d. Seema

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25. The volume V of a right circular cylinder is $V=\pi r^2 h$, where r is the radius of the base and h is the height of the cylinder. If the volume of a right cylinder is 45π and its height is 5, what is the circumference of its base?

   a. 9   b. 3π c. 6π d. 9π

26. If in a coded language, FLAME is coded as 6121135, then 21215120 is the code for_____

   a. VOICE   b. BALD   c. BLOAT   d. CASTLE

27. Of the students in a school, 20 percent are in the science club and 30 percent are in music group. If 25 percent of the students in the school are in the music club and NOT in the science club, what is the percentage of the students which are in science club and NOT in the music club?
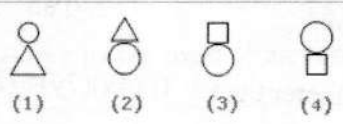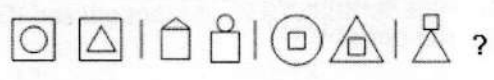
   a. 25%   b. 75%   c. 60%   d. 20%

28. The next number in the sequence 3, 6, 9, 30, 117...... is

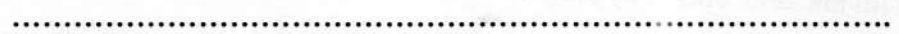   a. 192   b. 352   c. 388   d. 588

29. In an artificial language, *hapllesh* means cloudburst, *srenchoch* means pinball, and *resbosrench* means ninepin. Which word could mean "cloud nine"?

   a. leshsrench   b. ochhapl   c. haploch   d. haplresbo

30. Fill up the missing sequence:

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

Question Paper for Recruitment of Curator (Mechanical) - B

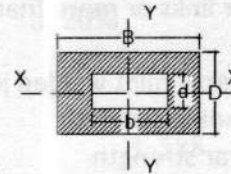Answer All Questions   Max. Marks: 70

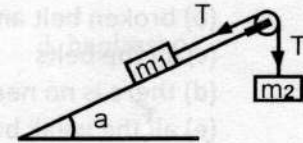## Section - B

1. Example of a Spherical Pair is:
    (a) bolt and nut   (b) lead screw of a lathe
    (c) ball and socket joint   (d) ball bearing and roller bearing

2. A mechanism is an assemblage of
    (a) two links   (b) three links
    (c) four links or more than four links   (d) all of the above

3. Transverse fillet welded joints are designed for
    (a) Bending strength   (b) Compressive strength
    (c) Shear strength   (d) Tensile strength

4. In multi-V-belt transmission, if one of the belt is broken, we have to change the
    (a) broken belt
    (b) broken belt and its adjacent belts
    (c) all the belts
    (d) there is no need of changing any one
    (e) all the weak belts.

5. The Value of
    $\lim_{X \to 0} (X^3 - \sin(X)/3)$ is
    A. 0   B. 3
    C. 1   D. -1

6. Lower pairs are those which have
    (a) point or line contact between the two elements when in motion
    (b) surface contact between the two elements when in motion
    (c) elements of pairs not -held together mechanically
    (d) two elements that permit relative motion

7. In the engineering stress-strain curve for mild steel, the Ultimate Tensile Strength (UTS)
    refers to:
    A. Yield stress   B. Proportional limit
    C. Maximum stress   D. Fracture stress.

8. In a company with 100 employees, 45 earn Rs. 20,000 per month; 25 earn Rs. 30,000; 20 earn Rs. 40,000; 8 earn Rs. 60,000; and 2 earn Rs. 150,000. The median of the salaries is:
   A. Rs. 20,000
   B. Rs.30,000
   C. Rs. 32,300
   D. Rs. 40,000

9. The resultant of the two forces P and Q is R. If Q is doubled, the new resultant is perpendicular to P. Then
   A. P = Q
   B. Q = R
   C. Q=2R
   D. None of these

10. The Centre of Gravity of a semi-circle lies at a distance of ....from its base measured along the vertical radius.
    A. $3r/8$
    B. $4r/3\pi$
    C. $8r/3$
    D. $3r/4\pi$

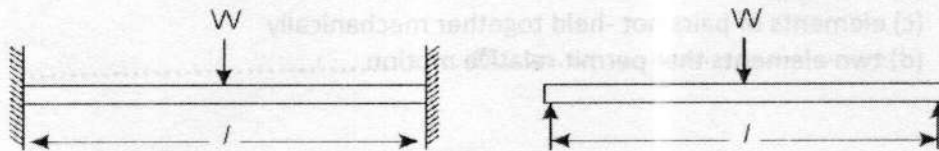11. Moment of Inertia of a hollow rectangular section as shown in the picture about X-X axis is

    A. $BD^3/12 - bd^3/12$
    B. $DB^3/12 - db^3/12$
    C. $BD^3/26 - bd^3/36$
    D. $DB^3/36 - db^3/36$

12. A block of mass m1 placed on an inclined smooth plane is connected by a light string passing over a smooth pulley to mass m2, which moves vertically downwards as shown in the figure. The tension in the string is

    A. $m1/m2$
    B. $m1.g.\sin (a)$
    C. $m1.m2/m1+m2$
    D. $m1.m2.g(1+\sin (a))/(m1+m2)$

13. Resilience is the
    A. energy stored in a body when strained within elastic limits
    B. energy stored in a body when strained upto the breaking of the specimen
    C. maximum strain energy which can be stored in a body
    D. None of the above.

14. Two beams 'X' and 'Y' carrying a central point load 'W' are shown below. The deflection of the beam 'X' will be _____ as compared to beam 'Y'.

    A. One-eighth
    B. One-fourth
    C. One-half
    D. double

15. Two closely coiled helical springs 'A' and 'B' of the same material, same number of turns and made from same wire are subjected to an axial load 'W'. The mean diameter of Spring 'A' is double the mean diameter of spring 'B'. The ratio of deflections in spring 'B' to spring 'A' will be
    A. 1/8
    B. 1/4
    C. 2
    D. 4

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16. The object of caulking in a riveted joint is to make the joint

    A. Free from corrosion   B. Stronger in tension
    C. Free from stresses   D. leak-proof

17. For flow of viscous fluid over a flat plate, if the fluid temperature is the same as the plate temperature, the thermal boundary layer is

    A. thinner than the velocity boundary layer
    B. thicker than the velocity boundary layer
    C. of the same thickness as the velocity boundary layer
    D. not formed at all

18. A swimmer can swim 10 km in 2 hrs. when swimming along the flow of a river, while swimming against the flow, she takes5 hours for the same distance. Her speed in still water (in km/hr) is _____

    A. 4.5 km/hr.   B. 3.5 km/hr.   C. 5.25 km/hr.   D. 4.75 km/hr.

19. The liquid used in manometers should have

    A. Low density   B. High density
    C. Low surface tension   D. High surface tension

20. A body floating in a liquid is said to be in neutral equilibrium, if its metacenter

    A. coincides with its Centre of gravity   B. lies above its Centre of gravity
    C. lies below its Centre of gravity   D. lies between the centre of buoyancy and
                                                      centre of gravity

21. The power transmitted through a pipe is

    A. w x Q x H   B. w x Q x h_f
    C. w x Q x(H - h_f)   D. w x Q x (H + h_f)
    Where w - specific weight in N/m^3; H – total supply head; h_f – head lost due to friction and Q – discharge in m^3/s

22. The tangential velocity of the water element having a free vortex is

    A. directly proportional to its distance from the centre
    B. inversely proportional to its distance from the Centre
    C. directly proportional to the square of the distance from the Centre
    D. inversely proportional to the square of the distance from the Centre

3

23. A kinematic chain is known as a mechanism when

   A. None of the links are fixed
   C. Two of the links are fixed
   B. One of the links is fixed
   D. None of these

24. In a screw jack, the effort required to lift the load 'W' is given by

   A. $P = W \tan(\alpha - \Phi)$
   C. $P = W \tan(\Phi - \alpha)$
   B. $P = W \tan(\alpha + \Phi)$
   C. $P = W \cos(\alpha + \Phi)$

   α - Helix angle Φ – Angle of friction

25. In gears, the contact ratio is the ratio of

   A. Length of arc of contact to the circular pitch
   B. Length of arc of approach to the circular pitch
   C. Length of arc of recess to the circular pitch
   D. None of the above

26. If the rotating mass of a rim type flywheel is distributed on another rim type flywheel whose mean radius is half the mean radius of the former, then energy stored in the latter at the same speed will be

   A. four times the first one
   C. one fourth of the first one
   B. same as the first one
   D. one and a half times the first one

27. The addition of magnesium to cast iron increases its

   A. hardness
   C. corrosion resistance
   B. ductility and strength in tension
   D. creep strength

28. A steel alloy containing 36% nickel is called

   A. Stainless Steel
   C. Invar
   B. High Speed Steel
   D. Heat Resisting Steel

29. The main alloying elements in high speed steel in order of increasing proportion are

   A. Vanadiuim, chromium, tungsten
   C. chromium, titanium, vanadium
   B. tungsten, titanium, vanadium
   D. tungsten, chromium, titanium

30. The material in which the atoms are arranged chaotically, is called

   A. Crystalline material
   C. Amorphous material
   B. Mesomorphous material
   D. None of the above

4

Section - II

1. Write short notes on **any 5** of the following   - 3x5= 15 marks
   a. Lami's Theorem
   b. Work study and organizational efficiency
   c. Operations performed in Sheet Metal Work
   d. Annealing and its types
   e. CAD and 3D printing
   f. Manufacturing of Gears

2. What are the factors to be considered for designing transmission system for transferring power/motion from one point to the other? Also explain how each of these factors influences the choice and design.   - 5 marks

3. Prepare a design and sketch for automated printing machine for printing of the text 'NCSM' on one surface of a pencil having hexagonal cross section.   - 10 marks

4. Delicate electronic equipment having a footprint of 1.5 m x 0.6 m with a height of 1.2 m is required to be mounted in the outdoor at a height of 10 m. from the ground on a river bed side. Design the structure, draw a neat pencil sketch showing plan, elevation and isometric/oblique view and justify the choice of materials used in the design.   - 10 marks

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