SPARDHA 2017-18

001 **ALMA FIESTA 2018** 9-10

Indian Institute of Technology, Bhubaneswar

NAME:

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CLASS: ……

Contact Info: ……..

SCHOOL NAME:

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Email – ID (if available):

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INSTRUCTIONS

- Write your name, class and school name in the space provided above.
- Test will be of **1 hour.**
- Use only ***black ball-point pen*** to choose answers.
- **Darken** the circle in the OMR to select your answer. Do NOT circle, highlight, tick, etc. Answers chosen with anything else will not be considered for mark evaluation.
- ***4 marks will be awarded*** for a correct answer and ***1 will be deducted*** for an incorrect answer.
- No marks will be awarded for questions left unanswered.
- Rough work should ***strictly*** be done on the last page provided. Marks will be deducted for scribbling rough work on papers with questions on it.
- Calculators and other electronic gadgets are ***strictly not allowed*** inside the examination hall. If found with any such device, the candidate will be ***immediately disqualified*.**
- Candidates are advised to bring pencil, eraser, pen and school ID card (if available).

ALL THE BEST

MATHEMATICS

1. If (2x+3y) is divisible by 17, then for what value of k is (9x+ky) definitely divisible by 17?

(A) 3 (B) 9 (C) 7 (D) 5

2. Given that $a^2+b^2 = 7$ and $a^3+b^3 = 10$, the greatest value of (a + b) is?

(A) 4 (B)5 (C)6 (D)9/2

3. If |x+3|=2 and |y+8|=3, find the least value of |xy|:

(A) 5 (B) -5 (C) 7 (D)1

4. Two circles, with unequal radii are touching at a point. An equilateral triangle is drawn to touch the larger circle (in this sense, the circle having the larger radius) at 3 points and the other circle at two points. Find the ratio of the areas of the two circles.

(A) π :36√3 (B) π :18√3 (C) π :27√3 (D) π :42√3

5. The unit's digit in the product of first 50 odd natural numbers is
(A) 0 (B) 7 (C) 5 (D) None of these

6. The mean of 90 items was found to be 45. Later on, it was discovered that two items were misread as 26 and 19 instead of 62 and 09 respectively. The correct mean is (approximately)

(A) 49.0 (B) 45.0 (C) 45.3 (D) 49.3

7. The expression $2x^3 + 3px^2 - 4x+p$ has a remainder of 5 when divided by x + 2, then the value of pis

(A) 0 (B) 1 (C) 2 (D) -1

8. The number of positive integral solutions of the equation, 2x + 3y = 763 is

(A)125 (B) 126 (C) 127 (D) 128

Comprehension (Q9-Q11)

A number 'n' when multiplied with 13 has only digit 7's in the product (i.e., 777 ...7). Let the product be denoted by m.

9. The number of digits in the smallest such 'n' is

(A) 4 (B) 5 (C) 6 (D) 7

10. The sum of distinct digits in the smallest such n is

(A) 19 (B) 24 (C) 33 (D) 40

11. All such possible numbers 'n' will also be divisible by

(A) 4 (B) 2 (C) 6 (D) 11

12. Let the sum of all the coefficients of the polynomial:
$(x - 2)^6(x - 4)^2 + (x + 1)^3(x - 2)^3 + (x + 1)^2(x - 4)^3$ be S, then S+83=?

(A) 38 (B) –24 (C) –69 (D) 0

13. A number is successively divided by 8, 6 and 5 leaving 1, 5 and 4 as remainder respectively. What is the sum of remainders when order of divisors is reversed?

(A) 10 (B) 19 (C) 14 (D) 33

14. A rectangular tank has an inner length and breadth of 24 m and 20 m respectively. Water flows
through an inlet pipe at 180 m per minute. The cross-sectional area of the pipe is 0.5 m2 The tank takes half an hour to get filled. Find the depth of the tank (in m).

(A) 4.625 (B) 6.125 (C) 5.625 (D) 5.125

15. The value of 'a', for which one root of the equation $(a^2-5a+3)x^2 + (3a-1)x + 2 = 0$ is twice the other is:

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

16. The clock shows a time of 3:15 and your math enthusiast friend asks you to report the angle between the hour and the minute hand of the clock. What angle (in degrees) do you report?

(A) 0 (B) 7.5 (C)15 (D) 22.5

PHYSICS

17. A manufacturer marks the thermometer wrongly. At 0^0 C it reads 100^0 C, at 1000^0 C it reads 850^0 C. Then the reading 500^0 C will be at:

(A) 480^0 C (B) 433^0 C (C) 533^0 C (D) 633^0 C

18. A bullet of mass 10 g is fired from a rifle (initial velocity=60m/s). The bullet takes 0.003 s to move through its barrel and leaves with a velocity of 300 m/sec. The force exerted on the bullet by the rifle:

(A) 800 N (B) 700 N (C) 600 N (D) zero

19. A transformer's main function is

(A) To safeguard our homes from high current (B) Generation of Electricity

(C) Converts AC to DC (D) Distribution of Energy

20. The diameter of Saturn is almost ten times that of the Earth, yet its density is much less. This can best be explained by the fact that Saturn

(A) Is farther from the Sun (B) Is a gaseous planet

(C) Has a shorter period of rotation (D) Has a ring around its centre

21. A child is stuck on a frictionless horizontal surface and cannot exert any horizontal force by pushing against the surface. How can he get off?

(A) By running (B) By rolling (C) By jumping (D) By spitting or coughing

22. 1 kg of Iron ball and 1 kg of Cotton ball is dropped in vacuum from a height of 10m. Which will touch the ground first? (Given: Density of iron and cotton are 7000kg/m^3 and 450kg/m^3)

(A) Iron (B)Cotton (C)Both will touch the ground at the same time (D)None of these.

23. A sound tone is produced in water. When it enters air: (λ-Wavelength; f- Frequency)

(A) λ decreases, and f does not change (B) both λ and f increase

(C) both λ and f decrease (D) λ does not change and f decreases

24. If a lighter body (mass M_1 and velocity V_1) and a heavier body (mass M_2 and velocity V_2) have the same kinetic energy then

(A) $M_2V_2 < M_1V_1$ (B) $M_2V2 = M_1V_1$ (C) $M_2V_1 = M_1V_2$ (D) $M_2V_2 > M_1V_1$

25. Given: v is the average velocity of the object going under a uniformly accelerated motion. $u$and a are the initial velocity and acceleration of the same. Then which of the following is correct?

(A) $v=u+at$ (B)$v=u+2at$ (C)$v=u+at/2$ (D)$2v=u+at$

26. Carbon footprint is the amount of carbon dioxide released into the atmosphere as a result of the activities of a particular individual, organization, or community. Two power plants A and B near a city of population of 750 people produce 200 kJ and 500 kJ of power in a day respectively. They are operated each day in the month of December. Total CO_2 Emission per day for A and B are 100 cubic metre and 600 cubic metre. Assume Each person consumes same energy from each plant respectively. What is the carbon footprint of a person in the city?

Given: Carbon Footprint= CO_2 Emission in cubic centimetre/ Energy Used in J.

(A)1 (B)1.5 (C)1.33 (D)1.66

27. Which of these scientists made several path-breaking discoveries that include electromagnetic induction and the laws of electrolysis?

(A) Faraday (B) Lenz (C)Oersted (D)Newton

28. According to Einstein, 1 Atomic mass unit(u) is equivalent to

(A)1.7×10^{-10} J (B)1.5×10^{-10} J (C)1.3×10^{-10} J (D)1.6×10^{-10} J

CHEMISTRY

29. How is the following equilibrium affected by the addition of a catalyst and change in temperature?

(A) With the addition of catalyst, equilibrium constant increases.

(B) With the increase in temperature, equilibrium constant increases.

(C) With the addition of catalyst, equilibrium constant is not affected but with the increase in temperature equilibrium constant decreases.

(D) Equilibrium constant is a universal constant and hence cannot be affected by any change.

30. Which of the following reactions is a synthesis reaction?

(A) When steam is passed over red-hot coke, a mixture of carbon monoxide and hydrogen is formed.

(B) Sodium reacts with water to form sodium hydroxide and hydrogen.

(C) When the milk of lime (calcium hydroxide) is added to hot sodium carbonate solution, sodium

hydroxide is obtained, and calcium carbonate separates out as mud.

(D) Stannic chloride is prepared by passing chlorine into molten tin.

31. An ore of potassium is

(A) Bauxite (B) Dolomite (C) Carnallite (D) Cryolite

32. Which of the following can dissolve limestone?

(A) NH_3+H_2O (B) $NaOH+ H_2O$ (C) $CaO + H_2O$ (D) CO_2+H_2O

33. Bonds present in $CuSO_4.5H_2O(s)$ are:

(A) Electrovalent and covalent (B) Electrovalent and coordinate

(C) Electrovalent, covalent and coordinate (D) Covalent and coordinate

34. The solubility of potassium chloride in water at 20ºC is 34.7 g in 100 g of water. The density of solution is 1.3 g/ml. Calculate the % of mass/volume concentration of potassium chloride.

(A) 25.76% (B) 33.49% (C) 24.7% (D) 1.3%

35. Chemical 'A' is used for water softening to remove temporary hardness. 'A' reacts with sodium carbonate to generate caustic soda. What is 'A'?

(A) Gypsum (B) Slaked lime (C) Quick lime (D) Limestone

36. Which of the following statement is wrong about sodium hydroxide?

(A) It is a deliquescent substance (B) It is corrosive

(C) It dissolves ferric oxide (D) It releases hydrogen gas with aluminium

37. In graphite, carbon is in which hybridization?

(A) sp (B)sp^2 (C)sp^3 (D)dsp^2

38. P, Q, R, S are four gases. if the order of their critical temperature is as follows S<Q<R<P. Which of the following gas has the highest boiling point?

(A)P (B)Q (C)R (D)S

39. Removal of CO_2 and H_2O from atmospheric air by using KOH and anhydrous $CaCl_2$ is an example

of _____ and _____ changes respectively.

(A) Chemical, Chemical (B) Physical, Physical (C) Chemical, Physical (D) Physical, Chemical

40. The aqueous solution of aluminium sulphate is:

(A) Acidic (B) Basic (C) Amphoteric (D) Both (B) and (C)

General Awareness

41. Personnel management is a

(A) Point of view (B) Technique of thinking (C) Philosophy of management (D) All of these

42. Demonstration type of training method is used to train

(A) Workers (B) Supervision (C) Managers (D) All of the above

43. Name the campaign that will be launched by India on the occasion of the first ever UN World Youth Skills Day?

(A) Namami Gange Campaign (B) Skill India Campaign

(C) Yuva Kalyan Kosh (D) Sab Haath Rozgaar Campaign

44. You are on an absolutely frictionless surface (suppose on top of an ice block). How will you move?

(A) Take really big steps (B) Try to jump (C) Try to sneeze (D) None of these

45. You are deserted in an island, just like Bear Grylls. What should be your most important
concern?
(A) Lighting a fire (B) Finding fresh water (C) Hunting for food (D) Creating a shelter

46. Among the following, what is the thing that could've killed you ages ago and can kill you today too?
(A) Bubonic plague (B) Mosquitoes (C) Cholera (D) Dehydration

47. Subtle behaviours and communication styles that are used in the work environment and interactions with others are called:

(A)Hard skills (B)Computer skills (C)Soft skills (D)Time management

48. Hard skills are _____ skills used to perform daily job functions.

(A) Subtle (B) Time management (C) Creative thinking (D) Technical

49. Which of these is a 'soft' skill?

(A) Analysing (B) Monitoring (C)Budgeting (D) Counselling

50. Integrity is essential in all functions, but it is most crucial in?

(A) Leadership (B)Management (C) Supervision (D) Compliance