

अनुसूची - ४ (ख)  
बी.ई. प्रवेश परीक्षाको पाठ्यक्रमको नमूना  
(दफा २१ सँग सम्बन्धित)

100 multiple choice questions  
Mathematics 30, Physics 30, Chemistry 20 and English 20  
Each question carries 1 mark  
Select the correct answer

Time: 2 hours  
Full marks: 100 x 1 = 100

B.E. ENTRANCE EXAMINATION SAMPLE QUESTIONS

Mathematics (30 x 1 = 30)

1. The general solution of  $4 \sin^2 x = 1$  is  
a.  $n\pi \pm \frac{\pi}{6}$     b.  $n\pi \pm \frac{\pi}{3}$     c.  $2n\pi \pm \frac{\pi}{6}$     d.  $2n\pi \pm \frac{\pi}{3}$
2. The domain of  $\frac{|x-2|}{x-2}$  is  
a.  $\pm 1$     b.  $\pm 3$     c.  $\pm 2$     d.  $\pm 4$
3. The radius of the circle  $x^2 + y^2 - 2x + 6y - 15 = 0$  is  
a.  $2/3$     b.  $7/6$     c. 1    d.  $3/5$
4. The quadratic equation whose roots are -3 and -4 is  
a.  $x^2 - 7x + 12 = 0$     b.  $x^2 + 7x + 12 = 0$     c.  $x^2 + 7x - 12 = 0$     d.  $x^2 - 7x - 12 = 0$
5.  $\lim_{x \rightarrow \infty} \frac{\sin x}{x}$  is equal to  
a. 0    b. Cannot be found    c. 1    d. -1
6. The maximum value of  $f(x) = 1 + \cos x + \sin x$  is  
a. 2    b.  $\sqrt{2}$     c.  $2\sqrt{2}$     d.  $\sqrt{2} + 1$
7. The area bounded by  $y = x^3$  and x axis in the interval  $x=2$  to  $x=4$  is  
a. 24    b. 60    c. 16    d. 12
8. The area in the first quadrant between Y-axis and the curve  $2x = 3\sqrt{y}$  in the interval  $0 \leq y \leq 4$   
a. 2    b. 1    c. 8    d. 4
9. The slope of the tangent to the curve  $y = 5 + 8x - 2x^2 = 0$  at  $x=2$  is  
a. 0    b. -2    c. 2    d. 16
10. If  $A^2 - A + I = 0$  then  $A^{-1}$  equals  
a.  $A^{-2}$     b.  $A$     c.  $A + I$     d.  $A^{-2}$
11. If two vectors whose direction ratios are 1, 2, 3 and  $-k, 2, 1$  are perpendicular to each other then  
a.  $k=7$     b.  $k=4$     c.  $k=6$     d.  $k=3$
12. If the line  $2x + 3y + 4 + k(-x + y + 5) = 0$  is horizontal then the value of k is  
a. 0    b. 3    c. 1    d. 2
13. If  $a > b > 0$  and  $a, b \in \mathbb{R}$  then which of the following is not true?  
a.  $a - b > 0$     b.  $\frac{1}{a} < \frac{1}{b}$     c.  $b - a > 0$     d.  $\frac{1}{b} - \frac{1}{a} > 0$
14. If  $A = [-3, 4]$  and  $B = [2, 6]$  then  $A \cap B$  is  
a.  $[2, 4)$     b.  $(2, 4]$     c.  $(2, 4)$     d.  $[2, 4]$
15. The expression  $|2x + 1| < 3$  is same as  
a.  $-2 < x < -1$     b.  $-2 < x < 1$     c.  $2 < x < 3$     d.  $-1 < x < 2$
16. If  $f(x) = x + 1, g(x) = x^2 - 1$  and  $f[g(x)] = 16$ , then the value of x is

- a.  $\pm 3$       b.  $\pm 2$       c.  $\pm 1$       d.  $\pm 4$
17. In a triangle ABC, if  $a=3$ ,  $b=4$  and  $c=5$  then the value of  $\cos\left(\frac{c}{2}\right)$  is  
 a.  $1/\sqrt{2}$       b.  $\frac{\sqrt{3}}{2}$       c.  $\frac{1}{2}$       d.  $\frac{\sqrt{3}}{4}$
18. In the series  $1+6+11+16+\dots$  the eighth term is  
 a. 48      b. 36      c. 38      d. 39
19. The sum of the infinite geometric series is  $\frac{3}{4}$  and the common ratio is  $\frac{1}{3}$  then its first term is  
 a.  $\frac{1}{3}$       b.  $\frac{1}{4}$       c.  $\frac{4}{3}$       d.  $\frac{1}{2}$
20. The value of the determinant  $\begin{vmatrix} 3 & 34 & 49 \\ 0 & 4 & 15 \\ 0 & 0 & 2 \end{vmatrix}$  is  
 a. 0      b. 9      c. 24      d. None of the above
21. The value of  $k$  for which the equation  $4x^2 + 24x + k = 0$  has equal roots is  
 a. 36      b. -12      c. -36      d. 12
22. The equation of the line through the intersection of the lines  $x + 3y = 4$  and  $x + y = 2$  and having slope 2 is  
 a.  $2y - x = 1$       b.  $2x - y = 1$       c.  $2x + y = 1$       d.  $2y + x = 1$
23. The eccentricity of a hyperbola is  
 a. 1      b. Greater than 1      c. Less than 1      d. 0
24. Let  $P(n)$  be the statement “ $n(n+1)$  is divisible by 4”. Which of the following is not true?  
 a.  $P(5)$       b.  $P(3)$       c.  $P(4)$       d.  $P(7)$
25. If  $A = \begin{bmatrix} 0 & 2x-1 & y \\ 3 & 0 & -5 \\ 2 & 5 & 0 \end{bmatrix}$  is a skew symmetric matrix then  
 a.  $x = 1, y = -3$       b.  $x = -2, y = -2$       c.  $x = -1, y = -2$       d.  $x = 1, y = -3$
26. If one root of the equation  $x^2 - ax + 1 = 0$  is  $a$  then the other root is  
 a.  $\frac{1}{a}$       b.  $-\frac{1}{a}$       c.  $1 - a$       d.  $1 + a$
27. The number of unit vectors perpendicular to  $\vec{a}$  and  $\vec{b}$  are  
 a. 3      b. 2      c. 4      d. 1
28. The second derivative of  $f(x) = 1/x$  at point  $(1,1)$  is equal to  
 a. 2      b. 1      c. -1      d. -2
29. The range of the function  $f(x) = \sqrt{\frac{3-x}{x}}$  is  
 a.  $\{0, 3\}$       b.  $(0, 3]$       c.  $[0, \infty)$       d.  $(0, \infty)$
30. Two lines with slopes  $m_1$  and  $m_2$  are perpendicular to each other if  
 a.  $m_1 m_2 = 0$       b.  $m_1 m_2 = -1$       c.  $m_1 m_2 = 1$       d.  $m_1 m_2$  is undefined

Physics (30 x 1 = 30)

1. The distance moved by a uniform accelerating body starting from rest in time  $t$  is proportional to  
 a.  $\sqrt{t}$       b.  $t$       c.  $t^2$       d.  $t^{\frac{3}{2}}$
2. If a force  $F$  is applied on a body and it moves with velocity  $v$ , the power will be  
 a.  $Fv$       b.  $F/v$       c.  $Fv^2$       d.  $F/v^2$
3. If critical angle for a material to air is  $30^\circ$ , the refractive index will be  
 a. 1      b. 1.5      c. 2      d. 2.5
4. In an interference pattern minima are obtained when phase differences between interfering waves is  
 a.  $\pi/2$       b.  $2\pi$       c.  $2n\pi$       d.  $(2n - 1)\pi$
5. The resistance of a conductor of length  $l$ , cross sectional area  $A$  and resistivity  $\rho$  is given by  
 a.  $\rho A/l$       b.  $A/\rho l$       c.  $\rho l/A$       d.  $l/\rho$

6. A bulb has specification 1 kW and 20 Volts, the resistance of bulb is
  - a. 125  $\Omega$
  - b. 62.5  $\Omega$
  - c. 0.25  $\Omega$
  - d. 625  $\Omega$
7. A bar magnet of magnetic moment  $M$  is cut into two parts of equal length. The magnetic moment of either part is
  - a.  $M$
  - b.  $2M$
  - c.  $M/2$
  - d. Zero
8. Which of the following is a vector quantity
  - a. Electric current
  - b. Weight
  - c. Temperature
  - d. Pressure
9. A ray of light travelling in an optical fiber is due to
  - a. Refraction
  - b. Diffraction
  - c. Polarization
  - d. Total internal reflection
10. The excess pressure inside an air bubble of radius 0.2 mm, situated inside the water of surface tension  $0.07 \text{ N m}^{-1}$  is
  - a.  $400 \text{ N/m}^2$
  - b.  $1000 \text{ N/m}^2$
  - c.  $700 \text{ N/m}^2$
  - d.  $1400 \text{ N/m}^2$
11. A box of mass 50 kg is pulled up from the hold of a ship with a uniform velocity of  $1 \text{ ms}^{-1}$  by a vertical rope attached to it. The tension of the rope is
  - a. 550 N
  - b. 500 N
  - c. 50 N
  - d. 5000 N
12. The mean free path of a gas varies with absolute temperature as
  - a.  $T$
  - b.  $T^2$
  - c.  $T^{-1}$
  - d.  $T^4$
13. In a moving coil galvanometer, a current  $I$  produces a deflection  $\theta$  then
  - a.  $I \propto \tan \theta$
  - b.  $I \propto \theta$
  - c.  $I \propto \theta^2$
  - d.  $I \propto \sqrt{\theta}$
14. The temperature of  $40^\circ \text{C}$  in Farenheit scale will be
  - a.  $104^\circ \text{F}$
  - b.  $96^\circ \text{F}$
  - c.  $72^\circ \text{F}$
  - d.  $100^\circ \text{F}$
15. Dimensions of LC (product of self inductance and capacitance) are
  - a.  $[M^0L^0T^2]$
  - b.  $[M^0L^0T^{-2}]$
  - c.  $[M^0L^2T^2]$
  - d.  $[M^0L^0T^0]$
16. Two capacitors of capacitances  $C$  and  $nC$  are connected in parallel. The equivalent capacitance is
  - a.  $nc/(n+1)$
  - b.  $(n-1)c$
  - c.  $(n+1)c$
  - d.  $nc/(n-1)!$
17. To minimize spherical aberration two lenses of focal lengths  $f_1$  and  $f_2$  are placed within a distance of separation equal to
  - a.  $f_1 - f_2$
  - b.  $f_1 + f_2$
  - c.  $(f_1 - f_2)/2$
  - d.  $(f_1 + f_2)/2$
18. A wire is stretched to double its length. The stress produced is
  - a. Equal to  $Y$
  - b. Less than  $Y$
  - c. Greater than  $Y$
  - d. None
19. A car of mass  $m$  moving with a with speed  $V$  is stopped at a distance  $x$  by the friction between the tyres and the road. If the kinetic energy of the car is doubled, stopping distance will be
  - a.  $8x$
  - b.  $4x$
  - c.  $2x$
  - d.  $x$
20. The instrument to measure current is known as
  - a. Ammeter
  - b. Voltmeter
  - c. Potentiometer
  - d. Wattmeter
21. The collision in which the relative velocity after collision is zero is
  - a. Perfectly elastic collision
  - b. Perfectly inelastic collision
  - c. Semi elastic collision
  - d. May be elastic or inelastic
22. A fuse wire of radius 0.2 mm blows when current flowing is 5A. Value of current for another fuse wire of same material of radius 0.3 mm to blow is
  - a. 9.2 A
  - b. 12.4 A
  - c. 5 A
  - d. 20 A
23. When a woollen sweater worm over a nylon shirt is removed, sparking is due to
  - a. Static electricity
  - b. Current electricity
  - c. None
  - d. Both a, b
24. The frequency of a fork A is 3% more than the frequency of a standard fork whereas the frequency of fork B is 3% less. If fork A and B produce 6 beats per second the frequency of standard fork will be
  - a. 100 Hz
  - b. 106 Hz
  - c. 103 Hz
  - d. 112 Hz

25. A spring is in simple harmonic motion. If the mass of the pendulum is increased by 4 times the time period of the pendulum will  
 a. Increase 4 times b. Increase 4 times c. Increases 2 times d. Increase  $\frac{1}{2}$  times
26. The image, of a virtual object, produced by a convex mirror is  
 a. Virtual b. Inverted c. Real d. Diminished
27. With the rise in temperature, surface tension  
 a. Increases b. Decreases c. Remains constant d. Becomes zero
28. A wire resistance 16 ohm is bent into circular form. Then equivalent resistance between two points of any diameter is  
 a.  $16 \Omega$  b.  $4 \Omega$  c.  $32 \Omega$  d.  $16 \Omega$
29. If kinetic energy of a particle is increased by four times the De-Broglie wavelength becomes  
 a. 2 times b.  $\frac{1}{2}$  times c.  $\sqrt{2}$  times d.  $1/\sqrt{2}$  times
30. A wheel of moment of inertia  $5 \times 10^{-3} \text{ kgm}^2$  is making 20 rev/sec. The torque required to stop it in 10 sec is  
 a.  $2\pi \times 10^{-2} \text{ Nm}$  b.  $2\pi \times 10^2 \text{ Nm}$  c.  $2\pi \times 10^{-2} \text{ Nm}$  d.  $4\pi \times 10^{-2} \text{ Nm}$

Chemistry (20 x 1 = 20)

1. Which of the following is not a greenhouse gas  
 a.  $\text{CO}_2$  b.  $\text{N}_2$  c.  $\text{N}_2\text{O}$  d.  $\text{CH}_4$
2. 50 ml of 0.4N HCL was mixed with 100 ml of 0.8N  $\text{H}_2\text{SO}_4$ . The normality of resulting mixture is  
 a. 0.66 b. 1 c. 2 d. 1.5
3. Which if the following has hydrogen bond  
 a. Benzene b. Buffer solution c. Water d. HCL
4. How many litres of  $\text{O}_2$  at NTP are required to burn completely 2.2 g of propane  
 a. 44 L b. 22.4 L c. 5.6 L d. 84 L
5. Malachite is the ore of  
 a. Zn b. Na c. Fe d. Cu
6. Ammonia reacts with copper sulphate solution to form  
 a. Deep blue precipitate b. Black precipitate c. Yellow precipitate d. None
7. A hydrocarbon having molecular formula  $\text{C}_3\text{H}_6$  forms isomers equal to  
 a. 6 b. 5 c. 2 d. 4
8. Which one is the lightest metal in the periodic table  
 a. Na b. Rb c. K d. Li
9. Electron has maximum energy when it is at  
 a.  $n=1$  b.  $n=2$  c.  $n=\text{infinity}$  d. Same energy
10. Aqueous solution of sodium carbonate is  
 a. Acidic b. Neutral c. Alkaline d. Amphoteric
11. Graphite electrode is an example of  
 a. Reactive electrode b. Anode c. Cathode d. Non reactive
12. Bleaching action of  $\text{SO}_2$  is due to  
 a. Acidic nature b. Reduction c. Oxidation d. Hydrolysis
13. Ethylene is formed by the dehydration of  
 a.  $\text{CH}_3\text{CHO}$  b.  $\text{C}_2\text{H}_5\text{OH}$  c. Propyl alcohol d. Ethyl acetate
14. Which of the following metal carbonate is water soluble?  
 a.  $\text{Na}_2\text{CO}_3$  b.  $(\text{NH}_4)_2\text{CO}_3$  c. Both a and b d.  $\text{ZnCO}_3$
15. Froth floatation process is used for the metallurgy of  
 a. Sulphide ore b. Oxide ore c. Chloride ore d. Amalgam

16. The volume of water to be evaporated from 100 mL of decinormal acid solution to make it exactly 0.25N is:  
 a. 60 mL                      b. 40 mL                      c. 100 mL                      d. 80 mL
17. Which one is more reactive?  
 a. Ordinary H<sub>2</sub>                      b. Ortho H<sub>2</sub>                      c. Heavy H<sub>2</sub>                      d. Nascent H<sub>2</sub>
18. Which of the following is classified as a metal?  
 a. Ge                      b. As                      c. Fv                      d. Ar
19. Which among the following gas usually causes explosions in coal mines?  
 a. Hydrogen                      b. Oxygen                      c. Methane                      d. Nitrogen
20. What do we call the reaction when an acid and a base react together to form salt and water?  
 a. Reduction                      b. Oxidation                      c. Neutralization                      d. Combination

English (20 x 1 = 20)

1. “Boys cried loudly”. Loudly here is used as  
 a. Adjective                      b. Adverb                      c. Preposition                      d. Noun
2. Today is .....25<sup>th</sup> day of the month  
 a. the                      b. a                      c. an                      d. at
3. The past participle form of “speed” is  
 a. Sped                      b. Speeding                      c. Speeds                      d. Speeded
4. The synonym of “eradicate” is –  
 a. Envious                      b. Exterminate                      c. energy                      d. estimate
5. Let me get the papers ...  
 a. Print                      b. Printed                      c. Printing                      d. To print
6. Turn left .... The gate  
 a. at                      b. in                      c. into                      d. to
7. “The doctor is examining the patient” – the passive is .....  
 a. The patient is being examined by the doctor  
 b. The doctor is being examined by the patient  
 c. The patent will be examined by the doctor  
 d. The patient will be examined by the doctor
8. He said “the boy may go”. The indirect narration is  
 a. He said that the boy must go  
 b. He said that the boy could go  
 c. He said that the boy might go  
 d. He said that the boy will go
9. It is a small child, yet it is very clever – ‘yet’ here is used as .....  
 a. Adjective                      b. Conjunction                      c. Verb                      d. Noun
10. one who lives in the same time with another –  
 a. Contemporary                      b. Century                      c. Permanent                      d. Immortal
11. The ‘antonym’ of “offer” is –  
 a. Odd                      b. Oblige                      c. Rarely                      d. Refuse
12. The diminutive of “lamb” is  
 a. Lumber                      b. Kitten                      c. Lassie                      d. Lambkin
13. A clause is :-  
 a. a group of words that forms part of a sentence and has a subject and a predicate of its own  
 b. the largest unit of grammar usually containing a subject, a verb, an object etc  
 c. a letter representing a sound like a vowel that functions as a consonant

- d. a group of words, often without a finite verb, forming part of a sentence
14. Kathmandu is not so cold as Jomsom - "cold" here is used as –  
 a. Superlative                      b. Positive              c. Comparative      d. Adverb
15. 'I indulge in this film industry to uplift my social status' is a \_\_\_\_ sentence  
 a. Compound      b. Complex      c. Simple              d. None
16. The pay, we receive is not commensurate \_\_\_\_\_ the work we do  
 a. For                      b. with                      c. about                      d. to
17. \_\_\_\_\_ her labor hard, she passed the exam.  
 a. Because of                      b. Despite                      c. In spite of                      d. Therefore
18. The underlined word conduct takes the prefix \_\_\_\_  
 a. Un                                      b. mis                                      c. en                      d. de

**Read the passage carefully and answer the following questions**

Opera refers to a dramatic art form, originating in Europe, in which the emotional content is conveyed to the audience as much through music, both vocal and instrumental, as it is through the lyrics. By contrast, in musical theater an actor's dramatic performance is primary, and the music plays a lesser role. The drama in opera is presented using the primary elements of theater such as scenery, costumes, and acting. However, the words of the opera, or libretto, are sung rather than spoken. The singers are accompanied by a musical ensemble ranging from a small instrumental ensemble to a full symphonic orchestra.

19. We can understand from the reading that ---  
 a. orchestras in operas can vary considerably in size  
 b. here is argument over whether the music is important or the words in opera  
 c. drama in opera is more important than the music  
 d. operas depend on orchestras
20. It is pointed out in the reading that opera ---  
 a. has developed under the influence of musical theater  
 b. is a drama sung with the accompaniment of an orchestra  
 c. is the most complex of all the performing arts  
 d. is often performed in Europe