# SAMPLE QUESTIONS FOR B TECH - 2012

## Note: These questions are illustrative. The pattern, scope, arrangement, variety, difficulty level, etc in the actual question paper may vary.

## INSTRUCTIONS FOR CANDIDATES

1. Please do not open this booklet until you are told to do so.

2. Please fill up the necessary information in the space provided on the cover of the Question Booklet and the Answer-Sheet before commencement of the test.

3. The duration of the test is 3 hours. There are 200 questions.

4. Please check for the completeness of the Question Booklet immediately after opening.

5. Each question has four options marked (1), (2), (3) and (4).

6. Answers are to be marked on the Answer Sheet, which is provided separately.

7. Choose the correct option and darken the circle completely, corresponding to (1), (2), (3) or (4) against the relevant question number.

8. Use only HB pencil to darken the circle for answering.

9. Please do not darken more than one circle against any question, as scanner will not read the same correctly.

10. If you wish to change any answer, erase completely the one already marked and darken the fresh circle with an HB pencil.

11. Each question carries one mark. There will be no Negative Marking.

12. Rough work, if any, is to be done on the Question Booklet only. NO separate sheet will be provided/used for Rough Work.

13. Calculator, Pager, Mobile, Electronics gadgets etc. are not permitted inside the examination hall.

14. Candidates using unfair means in the test will be disqualified.

15. Appropriate civil/criminal proceedings will be instituted against the candidate taking or attempting to take this booklet or part of it outside the examination hall; besides cancellation of candidature.

16. The right to exclude any question(s) from final evaluation rests with the testing authority.

# English Language Comprehension

Take the words Entrepreneurship and Innovation. Does this sound like an easy recipe for an underdeveloped economy to follow? All that it must do to telescope with a few years the scores of years it took us to develop. Go abroad and copy more efficient methods, put them into effect at home, then sit back and wait for extra products to roll in. Of course, it doesn't quite work that way. People in the underdeveloped countries know this from bitter experience. Yet the same illusion keeps cropping up among the so-called advanced countries. Too often, we think we can send a few technical experts to a poor country to solve its problems. Occasionally, in connection with a particular technological process, experts have indeed been able to work wonders in this facile way. But such luck is exceptional. Experience shows development is truly a hard and slow process but not an impossible one. To hasten its evolution, spontaneous entrepreneurship and innovation must develop among the peoples directly involved. The emphasis is on creative innovation, because it is by no means a cut and dried task to adopt advanced foreign technology to an underdeveloped country's own use. It may be recalled, that the advanced technology was itself developed to meet the special conditions of the advanced countries. These conditions include high money wage rates, labours scarce in number but replete with industrial skills; plentiful capital inherited from the past, mass production, and so forth. These conditions do not prevail in less developed lands. This task of creative innovation is of one for undiluted rugged individualism. The government can do much to set up extension services in each region for consulting with farmers on the best seeds, methods of cultivation, and implements. By sponsoring vocational schools, and training courses in machine methods -and book keeping too – the government itself can innovate creativity. Somewhere between laissez-faire and totalitarianism each developing nation has to word out its own destiny.

1 The evolution of a developed country
      (1) is the result of its close contact with advanced countries
      (2) depends upon its economy and industrial skills
      (3) technological processes worked out by experts
      (4) trying to put into practice efficient methods from abroad to increase production.

2. An appropriate title for the passage could be
      (1) the evolution of a developed country
      (2) creative innovation and underdeveloped countries
      (3) the taste of creative innovation
      (4) entrepreneurship and Innovation.

Direction (Q3): Choose the alternative which is closest in meaning to the underlined word in the sentence.
3. The meeting was called to ruminate on recent events in the subcontinent.
      (1) examine    (2) ponder
      (3) argue      (4) discuss

4. Select the lettered pair of words which are related in the same way as the capitalized words are related to each other. COMMUNICATION : MESSAGE : :
      (1) humour : amusement      (2) expression : words
      (3) clarification : doubt      (4) radiation : cosmic

Directions (Q5): Choose the alternative which can be substituted for the given word/expressions.
5. That which can be interpreted in any way
    (1) Ambivalent    (2) Ambient
    (3) Amphibious    (4) Ambiguous

6. Select the part of the sentence which has an error
    (1) Since I was a child
    (2) I have never had
    (3) even a single opportunity
    (4) to visit my aunt.

7. Choose the correctly spelt word.
    (1) flamable    (2) flamboyance
    (3) flavescent  (4) flaxen

8. Fill in the blank: He generally………….the faults of his subordinates.
    (1) passed over        (2) passed through
    (3) passed upon    (4) passed out

# Mathematics

1. A number consists of two digits whose sum is 7. If the digits are reversed, then the number is increased by 27. The number is
    (1) 25        (2) 34        (3) 16        (4) 52

2. A student has to secure 15% marks to get through. If he gets 80 marks and fails by 70 marks, find the maximum marks set for the examination.
    (1) 900        (2) 1000        (3) 1200        (4) None of these.

3. The average of two numbers is 62. If 2 is added to the smaller number, the ratio between the numbers become 1:2. The smaller number is
    (1) 60        (2) 30        (3) 84        (4) 40

4. A jar contains black and white marbles. If there are ten marbles in the jar, then which of the following could not be the ratio of black to white marbles?
    (1) 9:1        (2) 7:3        (3) 1:10        (4) 1:4

5. If 7 maids with 7 mops chaned 7 floors in 7 hours, how long would it takes 3 maids to mop 3 floors with 3 mops?
    (1) 3 hours    (2) 49/3 hours (3) 7 hours    (4) 7/3 hours

6. Which of the following function is periodic ?
    (1)  $f(x) = x + \sin x$    (2)  $f(x) \cos \sqrt{x}$    (3)  $f(x) = \cos x^2$    (4)  $f(x) = \cos^2 x$

7. In a triangle $ABC$, $a=2$, $b=1+\sqrt{3}$, $\angle C=60°$ then the side $c$ is equal to
    (1)  $\sqrt{3}-1$        (2)  $\sqrt{2}+1$
    (3)  $\sqrt{6}$        (4)  None of these

8. If $A$ is Skew-Symmetric, then
   (1) $A = -A^T$          (2) $A = A^T$
   (3) $A = 1/A$          (4) None of these

9. If $a \cos A = b \cos B$ then the triangle is
   (1) equilateral        (2) right angled
   (3) isosceles          (4) isosceles or right angled

10. If $\vec{a}$ is perpendicular to $\vec{b}$ and $\vec{c}$ then
    (1) $\vec{a} \times (\vec{b} \times \vec{c}) = 1$        (2) $\vec{a} \times (\vec{b} \times \vec{c}) = 0$
    (3) $\vec{a} \times (\vec{b} \times \vec{c}) = -1$        (4) None of these

11. Area bounded by the curve $y = x \sin x$ and x-axis between $x=0$ and $x=2$
    (1) $\vec{a} \times (\vec{b} \times \vec{c}) = 1$        (2) $\vec{a} \times (\vec{b} \times \vec{c}) = 0$
    (3) $\vec{a} \times (\vec{b} \times \vec{c}) = -1$        (4) None of these

12. The function $f(x) = \cot^{-1} x + x$ increases in the interval
    (1) $(1, \infty)$     (2) $(-1, \infty)$     (3) $(-\infty, \infty)$     (4) $(0, \infty)$

13. If $\int \dfrac{dx}{1 + \sin x} = \tan\left(\dfrac{x}{2} + a\right) + b$, then
    (1) $a = -\dfrac{\pi}{4}, b \in R$        (2) $a = \dfrac{\pi}{4}, b \in R$
    (3) $a = \dfrac{5\pi}{4}, b \in R$        (4) None of these.

14. Angle between the lines $x^2 - y^2 - 2y - 1 = 0$ is
    (1) $\dfrac{\pi}{2}$     (2) $\dfrac{\pi}{3}$     (3) $\dfrac{5\pi}{12}$     (4) $\dfrac{\pi}{5}$

15. The order of the differential equation $\dfrac{d^2 y}{dt^2} + \left(\dfrac{dy}{dt}\right)^3 + y^4 = e^{-t}$ is
    (1) 1          (2) 2
    (3) 3          (4) 4

16. The maximum number of real roots of the equation $x^{2n} - 1 = 0$ is
    (1) 2     (2) 3     (3) $n$     (4) $2n$

17. $x$ and $y$ are two random variables with the same standard deviation and coefficient of correlation is $r$. Then the coefficient of correlation between $x$ and $x + y$ is
    (1) $\dfrac{1+r}{2}$     (2) $\dfrac{1-r}{2}$     (3) $\sqrt{\dfrac{1+r}{2}}$     (4) $\sqrt{\dfrac{1-r}{2}}$

18. A probability that a leap year selected at random contains either 53 sundays or 53 mondays, is

(1) $\frac{2}{7}$          (2) $\frac{4}{7}$          (3) $\frac{3}{7}$          (4) $\frac{1}{7}$

19. If a system contains a single non-zero vector, it is always
   (1) linearly independent          (2) linearly dependent
   (3) subspace          (4) None of these.

# Current Affairs Awareness

1. 'City of Seven Hills' is in
   (1) New York   (2) Rome      (3) San Francisco      (4) Belgium

2. Sachin Tendulkar does not endorse
   (1) Coke      (2) Adidas      (3) Airtel      (4) Boost

3. Next Olympic Games are scheduled to be held in
   (1) Beijing      (2) Sydney      (3) New Delhi      (4) London

4. Third World refers to
   (1) Developing countries      (2) Developed countries
   (3) Capitalist nations      (4) None of these

5. Sariska Reserve Forest is located in
   (1) Uttaranchal      (2) Maharashtra      (3) Jharkhand   (4) None of these

6. ...................is a book written by Late Dr. Mulkraj Anand, the eminent English author.
   (1) Coolie      (2) The Barbers Trade Union
   (3) Two leaves and a Bud      (4) All of these

7. Who is the present Cuban President?
   (1) Mr. Raul Castro      (2) Mr. Alan Garcia
   (3) Mr. Hugo Chavez      (4) None of the above

8. The new Governor of Reserve Bank of India is
   (1) C. Rangrajan      (2) Habil Khorkiwala
   (3) D. Subbarao      (4) None of these

# Physics

1. The dimension of magnetic field in M, L, T and C (Coulomb) is given as
   (1) $MLT^{-1}C^{-1}$
   (2) $MT^2C^{-2}$
   (3) $MT^{-1}C^{-1}$
   (4) $MT^{-2}C^{-1}$

2. Consider a uniform square plate of side 'a' and mass 'm'. The moment of inertia of this plate about an axis perpendicular to its plane and passing through one of its corners is
   (1) $4/6\ ma^2$
   (2) $3/4\ ma^2$
   (3) $2/3\ ma^2$
   (4) $1/5\ ma^2$

3. A satellite is moving around the Earth in a circular orbit with a velocity $V$. If the gravitational force of the Earth were to suddenly disappear, then the satellite would
   (1) spirally move away from the Earth.
   (2) move with a velocity $V$, tangentially to its circular orbit.
   (3) move radially outwards with a velocity $V$.
   (4) fall towards the surface of the Earth.

4. The fundamental forces of nature are most correctly given as:
   (1) graviton, photon, lepton, hadron
   (2) gravitational, electromotive, magnetic, atomic
   (3) chemical, mechanical, friction and atomic
   (4) gravitational, electromagnetic, strong interactive, weak interactive

5. If the sum of all the forces acting on a moving object is zero, the object will
   (1) slow down and stop
   (2) change the direction of its motion
   (3) accelerate uniformly
   (4) continue moving with constant velocity

6. You hold a rubber ball in your hand. The Newton's third law companion force to the force of gravity on the ball is the force exerted by the
   (1) Earth on the ball.
   (2) hand on the ball.
   (3) ball on the hand.
   (4) ball on the Earth.

7. According to the standard model of particle physics, which of the following is a force-carrying particle?
   (1) Photon
   (2) Quark
   (3) Neutron
   (4) Proton

8. Which of the following particles has not yet been observed but is generally theorized to exist?
   (1) Gravitons
   (2) Ffermionic hadrons
   (3) Ggluons
   (4) Mesons

9. A spring has a force constant $k$ and mass $m$ is suspended from it. The spring is cut in half and the same mass is suspended from one of the halves. If the frequency of oscillation in the first case is $\alpha$, then the frequency in the second case will be
   (1) $\dfrac{\alpha}{2}$
   (2) $\alpha\sqrt{2}$
   (3) $\alpha$
   (4) $2\alpha$

10. The electric field inside a conductor
    (1)  must be zero
    (2)  may be non-zero
    (3)  must be non-zero
    (4)  Both (1) and (3) are correct

11. The equivalent capacitance between points $A$ and $B$ is
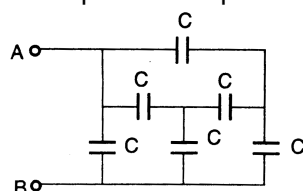


   (1)  $\dfrac{C}{4}$
   (2)  $\dfrac{C}{2}$
   (3)  C
   (4)  2C

12. Water is not used as a dielectric between the plates of a capacitor because its
    (1) dielectric constant is very low
    (2) dielectric strength is very low
    (3) dielectric constant is very high
    (4) dielectric strength is very large

13. Find the force of interaction of two dipoles, if the two dipole moments are parallel to each other and placed at a distance $x$ apart
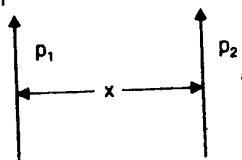


   (1) $\dfrac{3p_1 p_2}{4\pi\varepsilon_0 x^4}$
   (2) $\dfrac{p_1 p_2}{4\pi\varepsilon_0 x^4}$
   (3) $\dfrac{p_1 p_2}{\pi\varepsilon_0 x^4}$
   (4) $\dfrac{p_1 p_2}{3\pi\varepsilon_0 x^4}$

# Chemistry

1. When combining with nonmetallic atoms, metallic atoms generally will
    (1) lose electrons and form negative ions
    (2) lose electrons and form positive ions
    (3) gain electrons and from negative ions
    (4) gain electrons and form positive ions

2. What is the maximum number of covalent bonds than an atom of carbon can form?
    (1) 1
    (2) 2
    (3) 3
    (4) 4

3. A neutron has approximately the same mass as a
    (1) an alpha particle
    (2) a beta particle
    (3) an electron
    (4) a proton

4. Symbols represent atoms that are isotopes?
    (1) C-14 and N-14
    (2) O-16 and O-18
    (3) I-131 and I-131
    (4) Rn-222 and Ra-222

5. Which property is generally characteristic of an organic compound?
    (1) low melting point
    (2) high melting point
    (3) soluble in polar solvents
    (4) insoluble in nonpolar solvents

6. Which of the following is not a chemical change?
    (1) the boiling of water
    (2) the corroding of a copper roof
    (3) the exploding of gasoline
    (4) the dissolving of zinc by HCl

7. The products of the fermentation of sugar are ethanol and
    (1) Water
    (2) Oxygen
    (3) carbon dioxide
    (4) sulfur dioxide

8. The statement which describes a physical property of the element oxygen is
    (1) oxygen must be present for food to decay
    (2) oxygen is a component of water
    (3) oxygen is needed for the rusting of iron
    (4) oxygen supports the burning of paper

9. Dipole moment of cis-2, 3-dichloro-2-butene is ........ than the dipole moment of cis-1, 2-dichloro-ethene.
   (1) more
   (2) less
   (3) neither more nor less
   (4) None of the above

10. Which one of the following doesn't dissolve in the conc. $H_2SO_4$?
    (1) $CH_2=CH_2$
    (2) $CH_3-C\equiv C-CH_3$
    (3) $CH_3CH_2C\equiv CH$
    (4) $CH\equiv CH$

11. What is the correct IUPAC name of the compound?
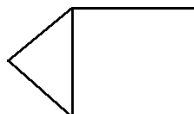


    (1) Bicyclo [2, 1, 0] pentane
    (2) Bicyclo [0, 1, 2] pentane
    (3) Bicyclo [0, 0, 0] pentane
    (4) Bicyclo [3, 4, 0] pentane

12. In which of the following reactions, phenol is not obtained?
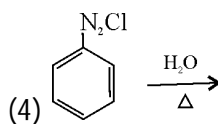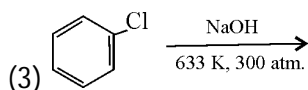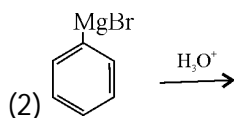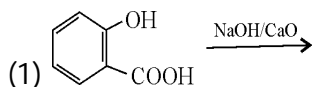


13 The shape of the orbital is determined by
   (1) spin quantum number
   (2) magnetic quantum number
   (3) azimuthal quantum number
   (4) principal quantum number

14. Which one of the following has highest entropy?
    (1) Water
    (2) Graphite
    (3) Mercury
    (4) Hydrogen

15. In the standardization of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by iodometry, the equivalent weight of $K_2Cr_2O_7$ is
    (1) Molecular weight/2
    (2) Molecular weight/6
    (3) Molecular weight/3
    (4) same as molecular weight