

**MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY, BATHINDA**  
(Established by Govt. of Punjab vide Punjab Act No. 5 of 2015)

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**PhD EntranceTest (PET-2017) Exam Pattern**

Total Marks: 100

Total Time : 90 Min

Section -I: Knowledge of the subject of specialization : 50 marks

Section -II: Research methodology/Quantitative/logical aptitude/language skills: 50 marks

- Each section shall be of 40 Multiple choice questions of 1.25 mark each
- Wrong answers will carry negative mark. 1/4<sup>th</sup> mark will be deducted for each wrong answer.
- **Candidate obtaining 50% marks or more shall be considered qualified, as per latest UGC Regulations-2016**

**Read following instructions carefully**

1. This questions paper contain X printed pages including pages for rough work. Please check all pages and report discrepancy, if any.
2. Question paper consists of 2 parts.
3. Section I (50 Marks), and
4. Section II (50 Marks)
5. All questions in this paper are of objective type.
6. Un-attempted Questions will carry zero marks.
7. Wrong answers will carry negative mark. 1/4<sup>th</sup> mark will be deducted for each wrong answer.
8. Calculator is not allowed in the examination hall.
9. Charts, graph sheets or tables are NOT allowed in the Examination hall.
10. Rough Work can be done on the question paper itself. Additionally, blank pages are given at the end of the question paper for rough work.
11. Answers must be shown by completely blackening the corresponding circles on Answer sheet

**EC : ELECTRONICS AND COMMUNICATION ENGINEERING**

**SAMPLE QUESTIONS FOR SECTION -I**

(Knowledge of the subject of specialization/ Technical Section : 50 Marks)

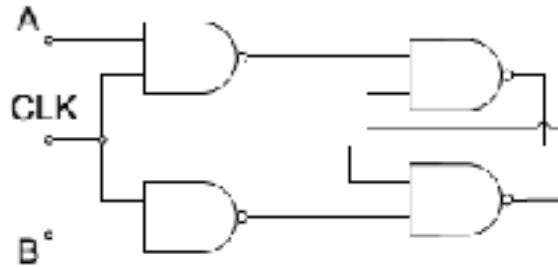
(40 Multiple choice questions of 1.25 marks each)

Roll No. \_\_\_\_\_

Discipline:   ECE  

**SECTION-I**

Q1: Consider the given circuit.



In this circuit, the race around

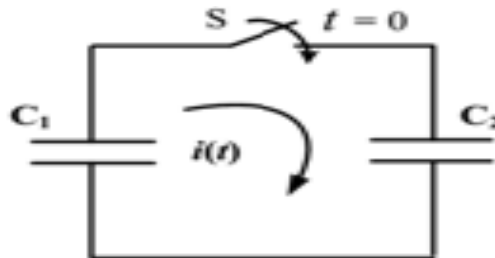
(A) does not occur

(B) occurs when CLK = 0

(C) occurs when CLK = 1 and A = B = 1

(D) occurs when CLK = 1 and A = B = 0

Q2. In the following figure, C1 and C2 are ideal capacitors. C1 has been charged to 12 V before the ideal switch S is closed at  $t = 0$ . The current  $i(t)$  for all  $t$  is



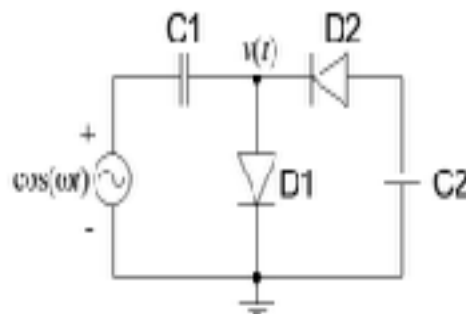
(A) zero

(B) a step function

(C) an exponentially decaying function

(D) an impulse function

Q3: The diodes and capacitors in the circuit shown are ideal. The voltage  $v(t)$  across the diode D1 is



(A)  $\cos(\omega t) - 1$

(B)  $\sin(\omega t)$

(C)  $1 - \cos(\omega t)$

(D)  $1 - \sin(\omega t)$

**ME : MECHANICAL ENGINEERING**

**SAMPLE QUESTIONS FOR SECTION –I**

(Knowledge of the subject of specialization/ Technical Section : 50 Marks)  
(40 Multiple choice questions of 1.25 marks each)

Roll No. \_\_\_\_\_

Discipline: \_\_\_\_\_

**SECTION-I**

- Q1. A heat engine is supplied with 2512 kJ/min of heat at 650°C. Heat rejection with 900 kJ/min takes place at 100°C. This type of heat engine is
- (a) Ideal
  - (b) Irreversible
  - (c) Impossible
  - (d) practical
- Q2. The COP of a refrigerator working on a reversed Carnot cycle is 5. The ratio of the highest absolute temperature to the lowest absolute temperature would be
- a) 1.25
  - b) 1.3
  - c) 1.4
  - d) 1.2
- Q3. Ammonia used as refrigerant is non-corrosive to
- a) Iron and steel
  - b) Copper & copper alloys
  - c) Both (a) & (b)
  - d) Neither (a) or (b)
- Q4. The comfort conditions in air- conditioning system are defined by
- a) 22°C dbt and 60% RH
  - b) 25°C dbt and 100% RH
  - c) 20°C dbt and 75% RH
  - d) 27°C dbt and 75% RH
- Q5. A bucket of water is hanging from a spring balance. An iron piece is suspended into water without touching any of the sides of bucket from another support . The spring balance reading will
- a) increase
  - b) decrease
  - c) remains the same
  - d) depends on the depth of immersion.
- Q6. The multistage compression of air as compared to single – stage compression
- a) improve volumetric efficiency for the given pressure ration
  - b) reduces work done per kg of air
  - c) gives more uniform torque
  - d) All of the above
- Q7.....

## CE : CIVIL ENGINEERING

### SAMPLE QUESTIONS FOR SECTION –I

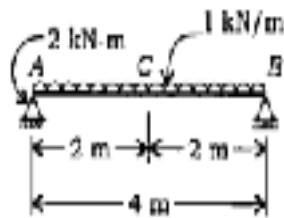
(Knowledge of the subject of specialization/ Technical Section : 50 Marks)  
(40 Multiple choice questions of 1.25 marks each)

Roll No. \_\_\_\_\_

Discipline: \_\_\_\_\_

#### SECTION-I

- Q1. The radial splits which are wider on the outside of the lof and narrower towards the pith are known as
- Star shakes
  - Annual rings
  - Cup shakes
  - Heart shakes
  -
- Q2. The initial setting of cement depends most on
- Tricalcium Aluminate
  - Tricalcium Silicate
  - Tricalcium Aluminoferrite
  - Dicalcium Silicate
- Q3. If one intends to obtain the best workability of concrete , the best workability of concrete,the preferred shape of aggregate is
- Round
  - Annular
  - Triangular
  - Flinty
- Q4.



A freely supported beam AB of span 4m is subjected to a UDL of 1kN/ m over the full span and a moment of 2kN-m at support A as shown in fig. The resulting BM at mid-span C of the beam will be

- 1 kN-m (sagging)
- 1 kN-m (hogging)
- 2 kN-m (sagging)
- 2 kN-m (hogging)

Q6.....

**EE : ELECTRICAL ENGINEERING**

**SAMPLE QUESTIONS FOR SECTION -I**

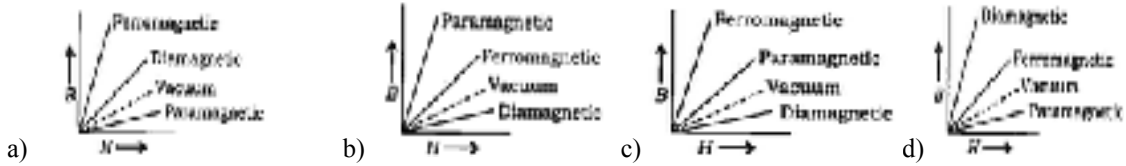
(Knowledge of the subject of specialization/ Technical Section : 50 Marks)  
(40 Multiple choice questions of 1.25 marks each)

Roll No. \_\_\_\_\_

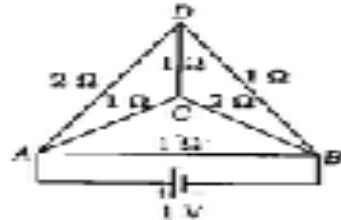
Discipline: \_\_\_\_\_

**SECTION-I**

Q1. The dependence of B(flux density ) on H (magnetic field intensity ) for different types of material is

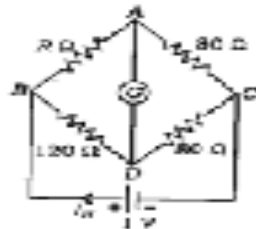


Q2. A triangular pyramid , built up of six wires whose resistances are shown in fig . , is fed from a 1V battery at the terminals A and B . The current through the branch DB is



- a) 1/7 A
- b) 2/7 A
- c) 3/7 A
- d) 4/7 A

Q3. In the circuit shown , when the current through the branch AD is zero, the battery current  $I_B$  is



- a) 1 mA
- b) 2 mA
- c) 10 mA
- d) 20 mA

Q5.....

**HUMANITIES & MANAGEMENT**  
**SAMPLE QUESTIONS FOR SECTION -I**

(Knowledge of the subject of specialization/ Technical Section : 50 Marks)  
(40 Multiple choice questions of 1.25 marks each)

Roll No. \_\_\_\_\_

Discipline: \_\_\_\_\_

**SECTION-I**

- Q1. A perfectly competitive firm would shut down if:
- a)  $AVC < AR$
  - b)  $AVC > AR$
  - c)  $AVC = MC$
  - d)  $AVC < MC$
- Q2. In the standard form of the CES production function with two inputs, a is the:
- a) Scale parameter
  - b) Distribution parameter
  - c) Efficiency Parameter
  - d) Substitution parameter
- Q3. Existing products in the markets can be easily imitated by any new entrant in monopolistic completion because of:
- a) Independent decision making
  - b) Highly elastic demand
  - c) Free movement of resources
  - d) Clubbing of close substitutes
- Q4: If a 12% fall in price of burgers leads to a 3% increase in quantity demanded of burgers, then  $e_p$  would be:
- a) -1.25
  - b) -4
  - c) -0.25
  - d) -0.5
- Q5 : Which on of the following is not a part of Porter's Five 'Force model'?
- a) Threat of new entrants
  - b) Firm's core competency
  - c) Rivalry among existing players
  - d) Threats of Substitutes
- Q6. If a leader is seen to possess certain personality characteristics, his/her leadership is described under :
- a) Trait Approach
  - b) Criterion Approach
  - c) The Administrative Approach
  - d) Attitude Approach

Q7.....

## PHARMACY

### SAMPLE QUESTIONS FOR SECTION –I

(Knowledge of the subject of specialization/ Technical Section : 50 Marks)

(40 Multiple choice questions of 1.25 marks each)

Roll No. \_\_\_\_\_

Discipline: \_\_\_\_\_

#### SECTION-I

- Q1: Which one of the following statement regarding insulin glargine is CORRECT?
- A) It is primarily used to control post-prandial hyperglycemia.
  - B) It may be administered intravenously in emergency cases.
  - C) It is a peak less insulin.
  - D) It should not be used in a regimen with insulin lispro or glulisine.
- Q2: The preferred insulin to control hyperglycemia in diabetic ketoacidosis,
- A) Lente insulin
  - B) Neutral protamine aspart
  - C) Regular human insulin
  - D) Isophane insulin
- Q3. Paracytic stomata are quite often found in the members of the family
- (A) Solanaceae
  - (B) Scrophulariaceae
  - (C) Rubiaceae
  - (D) Ranunculaceae
- Q4. Myasthenia gravis is diagnosed with improved neuromuscular function by using
- (A) Donepezil
  - (B) Pancuronium
  - (C) Atropine
  - (D) Edrophonium
- Q5. 3,4-Benzpyrene present in cigarette smoke reduces the therapeutic activity of diazepam by
- (A) Altering excretion
  - (B) Binding to plasma proteins
  - (C) Inhibiting metabolism
  - (D) Increasing the activity of liver microtonal enzymes.
- Q6. Which one of the following statements is wrong?
- (A) A singlet or triplet state may result when one of the electrons from the HOMO is excited to higher energy levels
  - (B) In an excited singlet state, the spin of the electron in the higher energy orbital is paired with the electron in the ground state orbital
  - (C) Triplet excited state is more stable than the singlet excited state
  - (D) When the electron from the singlet excited state returns to ground state, the molecule always shows fluorescence phenomenon

**PHYSICS**

**SAMPLE QUESTIONS FOR SECTION –I**

(Knowledge of the subject of specialization/ Technical Section : 50 Marks)

(40 Multiple choice questions of 1.25 marks each)

**Roll No.** \_\_\_\_\_

**Discipline:** \_\_\_\_\_

**SECTION-I**

Q1. Ferromagnetic materials respond mechanically to an impressed magnetic field, changing length slightly in the direction of the applied field. This property is known as

- (a) magnetocontraction
- (b) magnetostriction
- (c) transducerism
- (d) length contraction

Q2. For purely orbital angular momentum, the Lande' g factor is

- (a) 2
- (b) 1
- (c) 0
- (d) 3/2

Q3. In the Bode plot of an operation amplifier, a roll off rate of 20 dB/decade at high frequencies is equivalent to

- (a) 3 dB/octave
- (b) 2 dB/octave
- (c) 6 dB/octave
- (d) 9 dB/octave

Q4. In a light dependent resistor (LDR), the resistance

- (a) increases linearly with increase in the intensity of light
- (b) decreases linearly with increase in the intensity of light
- (c) increases non-linearly with increase in the intensity of light
- (d) decreases non-linearly with increase in the intensity of light

Q5. The theorem of equipartition of energy states the molecules in thermal equilibrium have same average energy associated with each independent degree of freedom and is

- (a)  $kT^2/2$  per molecule
- (b)  $kT/2$  per molecule
- (c)  $kT$  per mole
- (d)  $kT^2$  per mole

Q6. The dipolar polarizability of a dielectric

- (a) is independent of the temperature
- (b) is inversely proportional to the temperature
- (c) is directly proportional to the strength of the applied electric field
- (d) is inversely proportional to the strength of the applied electric field

Q8. ....

Q9. ....



## CHEMISTRY

### SAMPLE QUESTIONS FOR SECTION –I

(Knowledge of the subject of specialization/ Technical Section : 50 Marks)  
(40 Multiple choice questions of 1.25 marks each)

Roll No. \_\_\_\_\_

Discipline: \_\_\_\_\_

#### SECTION-I

Q1. The increasing order of ease of liquefaction of noble gases is:

- (A) He<Ne<Ar<Kr<Xe
- (B) Xe<Kr<Ar<Ne<He
- (C) Ne<He<Ar<Kr<Xe
- (D) Ne<Ar<He<Kr<Xe

Q2. For the reaction  $2\text{HI}(\text{g}) \rightarrow \text{H}_2(\text{g}) + \text{I}_2(\text{g})$ ,  $K_p = 0.0198$  at 721 K. In a particular experiment, the partial pressures of  $[\text{H}_2]$  and  $[\text{I}_2]$  at equilibrium are 0.710 and 0.888 atm, respectively. The partial pressure of HI is

- (A) 7.87 atm
- (B) 1.98 atm
- (C) 5.64 atm
- (D) 0.125 atm

Q3. Calculate the vibration partition function for the sodium dimer,  $\text{Na}_2$ , molecule at 298 K. The harmonic vibration wave number is  $159 \text{ cm}^{-1}$ .

- (A) 1.107
- (B) 1.542
- (C) 2.341
- (D) 1.866

Q4. Which of the following mixture of gases is used for breathing in deep of sea by divers?

- (A)  $\text{O}_2 + \text{N}_2$
- (B)  $\text{O}_2 + \text{He}$
- (C)  $\text{O}_2 + \text{Ne}$
- (D)  $\text{O}_2 + \text{CO}_2$

Q5.....

**SAMPLE QUESTIONS FOR SECTION –II / RESEARCH METHODOLOGY**  
**(FOR ALL DISCIPLINES)**

(Research Methodology/Quantative Aptitude/ Reasoning or logical aptitude/language skills: 50 marks  
(40 Multiple choice questions of 1.25 mark each)

**SECTION –II**

**Roll No.** \_\_\_\_\_

**Discipline:** \_\_\_\_\_

Q1. Which of the following techniques is used to measure the degree of association between two variables:

- a) Correlation Analysis
- b) Regression Analysis
- c) Dispersion
- d) Skewness

Q2. t- test and F- test are

- a) Parametric test
- b) Non Parametric test
- c) Both a and b
- d) None of these

Q3. The Poisson distribution is

- a) Symmetric
- b) Negatively Skewed
- c) Positively Skewed
- d) Log Skewed

Q4. The sum of squares of the deviations of data values is minimum when the deviations are taken from

- a) Mean
- b) Median
- c) Mode
- d) Harmonic Mean

Q5. The value of both regression coefficients in a bivariate regression analysis are 0.7 and 1.7.

The value of Karl Pearson's correlation co-efficient is:

- a) 0.84
- b) -0.84
- c) 0.91

d) -0.91

Q6. Peakedness and Flatness of curve in frequency distribution is measured by:

- a) Kurtosis
- b) Skewness
- c) Mode
- d) Quartile

Q7. An ordinal scale is

- a) The simplest form of measurement
- b) A Rank order scale of measurement
- c) A Scale with absolute zero point scale
- d) A scale with equal interval between adjacent numbers

Q8. Which is most suitable method of collecting large size data in quick and expensive way

- a) Survey
- b) In depth Interview
- c) Observation
- d) None of above

Q9. A researcher investigates five personality traits to test if they can explain the purchasing behavior of automobile buyers. What kind of research is this?

- a) Basic Research
- b) Applied Research
- c) Scientific Research
- d) None of the Above

Q10. Researchers use both open-ended and closed-ended questions to collect data. Which of the following statements is true?

- a) open-ended questions directly provide quantitative data based on the researcher's predetermined response categories
- b) Closed-ended questions provide quantitative data in the participant's own words
- c) Open-ended questions provide qualitative data in the participant's own words
- d) Closed-ended questions directly provide qualitative data in the participants' own words

Q11. Range and Quartile deviation are

- a) The measures of Dispersion
- b) Methods of sampling
- c) Techniques of report writing

d) Methods of factor analysis

Q12. Descriptive research is conducted for all of the following reasons except:

- a) to describe the characteristics of relevant groups, such as consumers, salespeople, organizations, or market areas
- b) to determine the degree to which management variables are associated
- c) to understand which variables are the cause and which variables are the effect of a phenomenon
- d) to determine the perceptions of product characteristics

Q13. A researcher is generally expected to

- a) Study the existing literature in the field
- b) Generate new principles and theories
- c) Evaluate findings of study
- d) Synthesize the idea of others

Q14. Which scientific method is bottom up approach to research

- a) Deductive Method
- b) Inductive Method
- c) Hypothesis Method
- d) Pattern Method

Q15. \_\_\_\_\_ refers to a sample of respondents who have agreed to provide information at specified intervals over an extended period.

- a) Experiment
- b) Survey
- c) Panel
- d) None of the above

Q16: Which of the options given below best completes the following sentence?

She will feel much better if she \_\_\_\_\_.

- (A) will get some rest
- (B) gets some rest
- (C) will be getting some rest
- (D) is getting some rest

Q17: Choose the most appropriate word from the options given below to complete the following sentence.

Communication and interpersonal skills are \_\_\_\_\_ important in their own ways.

- (A) Each
- (B) both
- (C) all
- (D) either.

Q18: Find Antonym

Stapling 1,000 Books by hand is a very tedious work.

- (A) Simple
- (B) Difficult
- (C) Interesting
- (D) Boring

Q19. If a person buys one ticket of a State lottery, then the probability that he wins a price is 0.11. If a person buys one ticket each month for five months, what is the probability that he will win least one price ?

- a) 0.55
- b) 0.50
- c) 0.44
- d) 0.56

Q20. If two dice are thrown, the probability that the sum of points is greater than 9 is:

- a)  $1/2$
- b)  $1/3$
- c)  $1/6$
- d)  $1/4$

Q21. In an effort to \_\_\_\_\_ its operation, the corporation announced it was acquiring a \_\_\_\_\_ company in different type of manufacturing.

- a) Diversify ----- Subsidiary
- b) Multiply ----- Protracted
- c) Extend ----- Same
- d) Intensify ----- Fluctuating

Q22. The solution that he worked out was not only correct but complicated.

- a) was not only correct but also complicated.

- b) was correct but complicated.
- c) was correct only but complicated.
- d) No correction required

Q23. Whether or not the rumors are true is besides the point

- a) The rumours are true are beside the point.
- b) The rumours are true is beside the point.
- c) The rumours are true are besides the point.
- d) No correction required

Q24. No parent would \_\_\_\_\_ childcare for childhood. \_\_\_\_\_, seeing the world anew through a child's eyes can be a powerful source of stimulation.

- a) mistake, still
- b) reject, yet
- c) conflate, however
- d) opt, besides

Q25: It takes 30 minutes to empty a half-full tank by draining it at a constant rate. It is decided to simultaneously

pump water into the half-full tank while draining it. What is the rate at which water has to be pumped in so that it gets fully filled in 10 minutes?

- (A) 4 times the draining rate
- (B) 3 times the draining rate
- (C) 2.5 times the draining rate
- (D) 2 times the draining rate

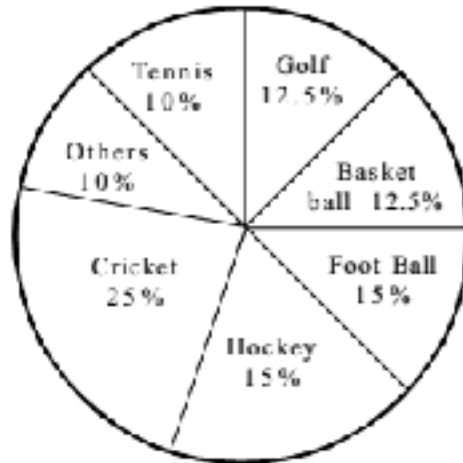
Q26: For an  $n$ -variable Boolean function, the maximum number of prime implicants is

- (A)  $2(n-1)$
- (B)  $n/2$
- (C)  $2n$
- (D)  $2^{(n-1)}$

Q27: The pie-chart drawn below shows the spending of a country on various sports during a particular year.

Study the pie-chart carefully and answer the questions given below it.

PERCENT OF MONEY SPENT ON VARIOUS SPORTS FOR ONE YEAR



- (A) If the total amount spent on sports during the year was Rs. 15000000, the amount spent on cricket and hockey together was
- (A) Rs. 2500000 (B) Rs. 3750000  
 (C) Rs. 5000000 (D) Rs. 6000000
- (B) Out of the following, the country spent the same amount on
- (A) Hockey and Tennis (B) Golf and foot ball  
 (C) Cricket and Foot ball (D) Football and Hockey
- (C) The ratio of the total amount spent on football to that spent on hockey is
- (A) 1: 15 (B) 1: 1  
 (C) 15:1 (D) 3: 20
- (D) If the total amount spent on sports during the year was Rs. 12000000, how much was spent on basket ball?
- (A) Rs. 950000 (B) Rs. 1000000  
 (C) Rs. 1200000 (D) Rs. 1500000