JE (Elt)

योजना तथा वास्तुकला विद्यालय, विजयवाड़ा
School of Planning and Architecture, Vijayawada
An Institute of National Importance, MHRD, Govt. of INDIA.

WRITTEN TEST FOR NON-FACULTY RECRUITMENT

Application No	

Date: **Total Max. Marks: 100** **Duration: Two Hours**

Part-1: General Intelligence (Max. Marks: 40)
Part-2: Domain Knowledge (Max. Marks: 60)
Part-2A: Objective Type (Max. Marks: 40)
Part-2B: Descriptive Type (Max. Marks: 20)

INSTRUCTIONS

1. The question paper cum answer sheet is in the form of test booklet.
2. Each objective question has four multiple options as (a), (b), (c) and (d) with one correct answer. Answer to be filled in the box provided against each objective question.
3. All objective questions carry one mark each, and descriptive type questions carry 10 marks each.
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5. Enter your application number correctly.
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Written Test for Junior Engineer (Electrical)

Part-1: General Intelligence (Objective Type) **(Max. Marks: 40)**

Q1) Find the odd one out in the following sequence
3, 5, 7, 12, 17, 19
(a) 19 (b) 12 (c) 17 (d) 5

Q2) A truck covers a distance of 550 meters in 1 minute whereas bus covers a distance of 33 Kms in 45 minutes. The ratio of their speeds is
(a) 3 : 4 (b) 4 : 3 (c) 3 : 5 (d) 5 : 3

Q3) If the mean of 5 observations x, $x+2$, $x+4$, $x+6$ and $x+8$ is 11, then the mean of last three observations is
(a) 11 (b) 15 (c) 13 (d) 17

Q4) A dishonest dealer professes to sell his goods at cost price. But he uses a false weight and thus gains $6\frac{18}{47}\%$. For a kg he uses a weight of
(a) 940 gms (b) 947 gms (c) 953 gms (d) 960gms

Q5) A student has to obtain 33% of the total marks to pass. He got 125 marks and failed by 40 marks. The maximum marks are
(a) 300 (b) 500 (c) 800 (d) 1000

Q6) If the side of the square is increased by 5 cm; the area increases by 165 sq cm. The side of the square is
(a) 12 cm (b) 13 cm (c) 14 cm (d) 15 cm

Q7) 'x' varies inversely as square of y. Given that $y=2$ for $x=1$. The value of x for $y=6$ will be equal to
(a) 3 (b) 9 (c) 1/3 (d) 1/9

Q8) A sum of money amounts to ₹ 9800 after 5 years and ₹ 12005 after 8 years at the same rate of simple interest. The rate of interest per annum is
(a) 5% (b)8% (c) 12% (d) 15%

Q9) **Exercise** is to **obesity** as **water** is to _____
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Q11) A man is 24 years older than this son. In two years his age will be twice his son. The present age of the son is

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Q12) Choose the best alternative based on analogy

Quartz : Radio :: Gypsum : ?

(a) Glass (b) Porcelain (c) Cement (d) Powder

Q13) Choose the best alternative

A river always has _____

(a) Delta (b) Tributaries

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Q14) Choose the odd one

(a) Calendar (b) Month

(c) Date (d) Year

Q15) If *cushion* is called *pillow*, *pillow* is called *mat*, *mat* is called *bed-sheet* and *bed-sheet* is called *cover* ; which will be spread on the floor

(a) *Cover* (b) *bed-sheet*

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Q16) In a certain language, '479' means *'fruit is sweet'*; '248' means *'very sweet voice'*; and '637' means *'eat fruit daily'*. Which digit stands for *'is'* in that code?

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Q20) Nobel Laureate Aung San Sui Kyi is State Counsellor of which nation?

(a) Japan (b) Malaysia

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Q22) Dachigam Sanctuary in Kashmir is protected site for
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Q23) Who among the following was the Viceroy of India at the time of partitioning of Bengal?
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Q25) 2024 Summer Olympics will be held in _____
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Q26) Who among the following recently resigned from the post of vice-chairman of NITI Aayog in order to return to academia?
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Q27) Who among the following was appointed as the Prime Minister of Pakistan after Nawaz Sharif was disqualified by the country's Supreme Court over corruption allegations.
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Q30) Which word can be substituted for the given sentence
A name adopted by an author in his writings
(a) Nickname
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Q31) Which is the largest state in India
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Q33) Which of the following is **not** an input device

(a)Joystick (b) Mouse

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(a) Algorithm (b) Program

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(c) An algorithm can be written in any language.

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(a) Wide Area Network

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(Max. Marks: 40)

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(b) induction motor
(c) arc lamps
(d) fluorescent tubes

Q42) A fuse is inserted in
(a)neutral
(b) earth continuity conductor
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(d) both phase and neutral

Q43) The rating of a transformer is expressed in
(a) KVA (b) KW (c) HP (d) W

Q44) Kirchoff's Laws are applicable for
(a) DC circuits only
(b) AC circuits only
(c) Circuits with rectified AC supply
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Q45) The time constant for an RL circuit with $R = 2\ \Omega$ and $L = 4$ henry is
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(a) 239 (b) 257 (c) 125 (d) 250

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(b) Prevent eddy current loss
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Q54) Total losses occurring in a transformer when it is operating at its maximum efficiency are 2000 W. The total copper losses at this load are

(a) 2000 W (b) 1000 W (c) 1500 W (d) 800 W

Q55) In a Y-Y system, a line voltage of 220 V produces a phase voltage of:

(a) 381 V (b) 311 V (c) 220 V (d) 127 V

Q56) Distribution transformers have core losses

(a) >copper loss (b) =copper loss
(c) < copper loss (d) =1/2 (copper loss)

Q57) A charge of 240 C is transferred in 2 minutes. The current flowing is:

(a) 120A (b) 480A (c) 2A (d) 8A

Q58) The voltage across _____ cannot change abruptly

(a) Capacitor. (b) Inductor (c) Resistor (d) Thermistor

Q59) The back emf of a DC motor with P poles, Z conductors, a No. of parallel paths, and running at N rpm is given by

(a) $\frac{PN\Phi Z}{60a}$ (b) $\frac{P\Phi Z}{a}$ (c) $\frac{PN\Phi Z}{60}$ (d) $\frac{PNZ}{a}$

Q60) Out of the following which machine is also known as a generalized transformer

(a) DC motor (b) Induction Motor
(c) DC generator (d) Synchronous motor

Q61) The fifth band in color coded resistor indicates
(a)Reliability (b) Strength (c) Tolerance (d) Power rating

Q62) Conducting material normally used for standard resistance coils is
(a) manganin (b) nichrome (c)tungsten (d) copper

Q63) The root mean square value of resultant current in a wire which carries simultaneously a direct current of 10A, and a sinusoidal alternating current of peak value 10 A.
(a)14.4 (b) 7.07 (c) 11.4 (d) 12.2

Q64) One 200 V, 100 W bulb is connected in series with primary of a 200 V, 10 kVA transformer. If its secondary is left open circuited then the bulb would have
(a)Full brightness (b) poor brightness
(c) a little less than full brightness (d) more than full brightness

Q65) Maximum power is transferred from a source to a load when
(a) the load resistance is very large
(b) the load resistance is very small
(c) the load resistance is twice the source resistance
(d) the load resistance equals the source resistance

Q66) When a 400-Hz transformer is operated at 50 Hz, its rating is
(a) reduced to 1/8 (b) increased 8 times
(c)unaffected (d) increased 64 times

Q67) Window type ACs are use for rooms and offices with area approximately upto
(a) 50 sq m (b) 200 sq m (c)100 sq m (d) 20 sq m

Q68) A synchronous machine is called a doubly excited machine because
(a) it can be overexcited
(b) it has two sets of rotor poles
(c) both its rotor and stator are excited
(d) it needs twice the normal exciting current

Q69) _____ is the commonly observed temperature of air by conventional thermometer
(a) Dry Bulb temperature (b) Wet Bulb temperature
(c) Latent heat effect (d) Sensible heat effect

Q70) Central AC Plants are most economical for AC loads of more than _____ ton
(a) 5 (b) 50 (c)2 (d) 20

Q71) _____ is the temperature of saturation of air

(a) Relative Humidity
(b) Absolute Humidity
(c) Dew Point
(d) Latent heat effect

Q72) The solid angle subtended by an area of 2400 sq cm on the surface of a sphere of diameter 1.2 m

(a) 3/2 (b) 1/3 (c)2/3 (d) 2/5

Q73) The total quantity of light emitted per second by a light source is known as _____.

(a) Luminous flux
(b) Luminous Intensity
(c) Illumination
(d) Luminance

Q74) The sum of reflection factor, absorption factor and transmission factor for any material is

(a) Equal to zero
(b) Less than zero
(c) Equal to unity
(d) Greater than unity

Q75) Which of the following lamps are particularly suitable in fog?

(a) Mercury vapour lamps
(b) Sodium Vapour Lamps
(c) Compact Fluorescent Lamps
(d) Incandescent Lamps

Q76) Lux is the unit for the measurement of _____.

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Q77) Step potential and Touch potential are associated with

(a) High Voltage Transmission
(b) Earthing of Substation
(c) Rise in receiving end voltage
(d) Dip in Distribution voltage

Q78) The Diesel Power Plant are mainly used as

(a) Peak Load plant
(b) Base Load Plant
(c) Stand by plant
(d) Both peak and Stand by plants

Q79) The cetane number of Diesel fuels are usually in the range of

(a) 10-200
(b) 20-400
(c) 30-60
(d) 10-20

Q80) One kWh of electrical energy equals

(a) 3600 J (b) 860 kcal (c) 3600 W (d) 4186 J

Part-2B: Domain Knowledge (Descriptive Type) **(Max. Marks: 20)**

Q81) A single phase transformer working at unity power factor has an efficiency of 90 % at both half load and at full load of 500 W. Determine the efficiency at 75 % of full load.

Q82) Draw a line diagram/block diagram of system employed for distribution of electrical energy in domestic installation. Also draw a circuit diagram for the stair case wiring employed in multi-storied buildings.

Answer Key

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C

Q57) A charge of 240 C is transferred in 2 minutes. The current flowing is:

(a) 120A (b) 480A (c) 2A (d) 8A

C

Q58) The voltage across _____ cannot change abruptly

(a) Capacitor. (b) Inductor (c) Resistor (d) Thermistor

A

Q59) The back emf of a DC motor with P poles, Z conductors, a No. of parallel paths, and running at N rpm is given by

(a) $\frac{PN\Phi Z}{60a}$ (b) $\frac{P\Phi Z}{a}$ (c) $\frac{PN\Phi Z}{60}$ (d) $\frac{PNZ}{a}$

A

Q60) Out of the following which machine is also known as a generalized transformer

(a) DC motor (b) Induction Motor
(c) DC generator (d) Synchronous motor

B

Q61) The fifth band in color coded resistor indicates
(a)Reliability (b) Strength (c) Tolerance (d) Power rating

A

Q62) Conducting material normally used for standard resistance coils is
(a) manganin (b) nichrome (c)tungsten (d) copper

A

Q63) The root mean square value of resultant current in a wire which carries simultaneously a direct current of 10A, and a sinusoidal alternating current of peak value 10 A.
(a)14.4 (b) 7.07 (c) 11.4 (d) 12.2

D

Q64) One 200 V, 100 W bulb is connected in series with primary of a 200 V, 10 kVA transformer. If its secondary is left open circuited then the bulb would have
(a)Full brightness (b) poor brightness
(c) a little less than full brightness (d) more than full brightness

B

Q65) Maximum power is transferred from a source to a load when
(a) the load resistance is very large
(b) the load resistance is very small
(c) the load resistance is twice the source resistance
(d) the load resistance equals the source resistance

D

Q66) When a 400-Hz transformer is operated at 50 Hz, its rating is
(a) reduced to 1/8 (b) increased 8 times
(c)unaffected (d) increased 64 times

A

Q67) Window type ACs are use for rooms and offices with area approximately upto
(a) 50 sq m (b) 200 sq m (c)100 sq m (d) 20 sq m

D

Q68) A synchronous machine is called a doubly excited machine because
(a) it can be overexcited
(b) it has two sets of rotor poles
(c) both its rotor and stator are excited
(d) it needs twice the normal exciting current

C

Q69) _____ is the commonly observed temperature of air by conventional thermometer
(a) Dry Bulb temperature (b) Wet Bulb temperature
(c) Latent heat effect (d) Sensible heat effect

A

Q70) Central AC Plants are most economical for AC loads of more than _____ ton
(a) 5 (b) 50 (c)2 (d) 20

B

Q71) _____ is the temperature of saturation of air

(a) Relative Humidity (b) Absolute Humidity
(c) Dew Point (d) Latent heat effect

C

Q72) The solid angle subtended by an area of 2400 sq cm on the surface of a sphere of diameter 1.2 m

(a) 3/2 (b) 1/3 (c)2/3 (d) 2/5

C

Q73) The total quantity of light emitted per second by a light source is known as_____.

(a) Luminous flux (b) Luminous Intensity
(c) Illumination (d) Luminance

A

Q74) The sum of reflection factor, absorption factor and transmission factor for any material is

(a) Equal to zero (b) Less than zero
(c) Equal to unity (d) Greater than unity

C

Q75) Which of the following lamps are particularly suitable in fog?

(a) Mercury vapour lamps (b) Sodium Vapour Lamps
(c) Compact Fluorescent Lamps (d) Incandescent Lamps

B

Q76) Lux is the unit for the measurement of _____.

(a) Luminous flux (b) Luminous Intensity
(c) Illumination (d) Luminance

C

Q77) Step potential and Touch potential are associated with

(a) High Voltage Transmission (b) Earthing of Substation
(c) Rise in receiving end voltage (d) Dip in Distribution voltage

B

Q78) The Diesel Power Plant are mainly used as

(a) Peak Load plant (b) Base Load Plant
(c) Stand by plant (d) Both peak and Stand by plants

D

Q79) The cetane number of Diesel fuels are usually in the range of

(a) 10-200 (b) 20-400
(c) 30-60 (d) 10-20

C

Q80) One kWh of electrical energy equals

(a) 3600 J (b) 860 kcal (c) 3600 W (d) 4186 J

B

Part-2B: Domain Knowledge (Descriptive Type) **(Max. Marks: 20)**

Q81) A single phase transformer working at unity power factor has an efficiency of 90 % at both half load and at full load of 500 W. Determine the efficiency at 75 % of full load.

Efficiency of the transformer at full load = 0.9

Output at full load = 500 W

Let the iron losses of the transformer be = x W

and the total copper losses at full load be = y W

Then, the total losses at full load = $x + y$

Hence $$0.9 = \frac{500}{500 + x + y}$$

or $$0.9x + 0.9y = 50$$

Efficiency of the transformer at half of full load = 0.9

Total copper losses at half of full load = $\left(\frac{1}{2}\right)^2 \times y = \frac{y}{4}$

Output of the transformer = $\frac{1}{2} \times 500 = 250$ W

Thus $$0.9 = \frac{250}{250 + x + y/4}$$

or $$0.9x + 0.225y = 25$$

Solving Eqs (i and ii)

$$y = 37 \text{ W} \quad \text{and} \quad x = 18.53 \text{ W}$$

i.e. total copper losses at full load = 37 W

Iron losses = 18.53 W

Output of the transformer at 75 per cent of full load

$$= 0.75 \times 500 = 375 \text{ W}$$

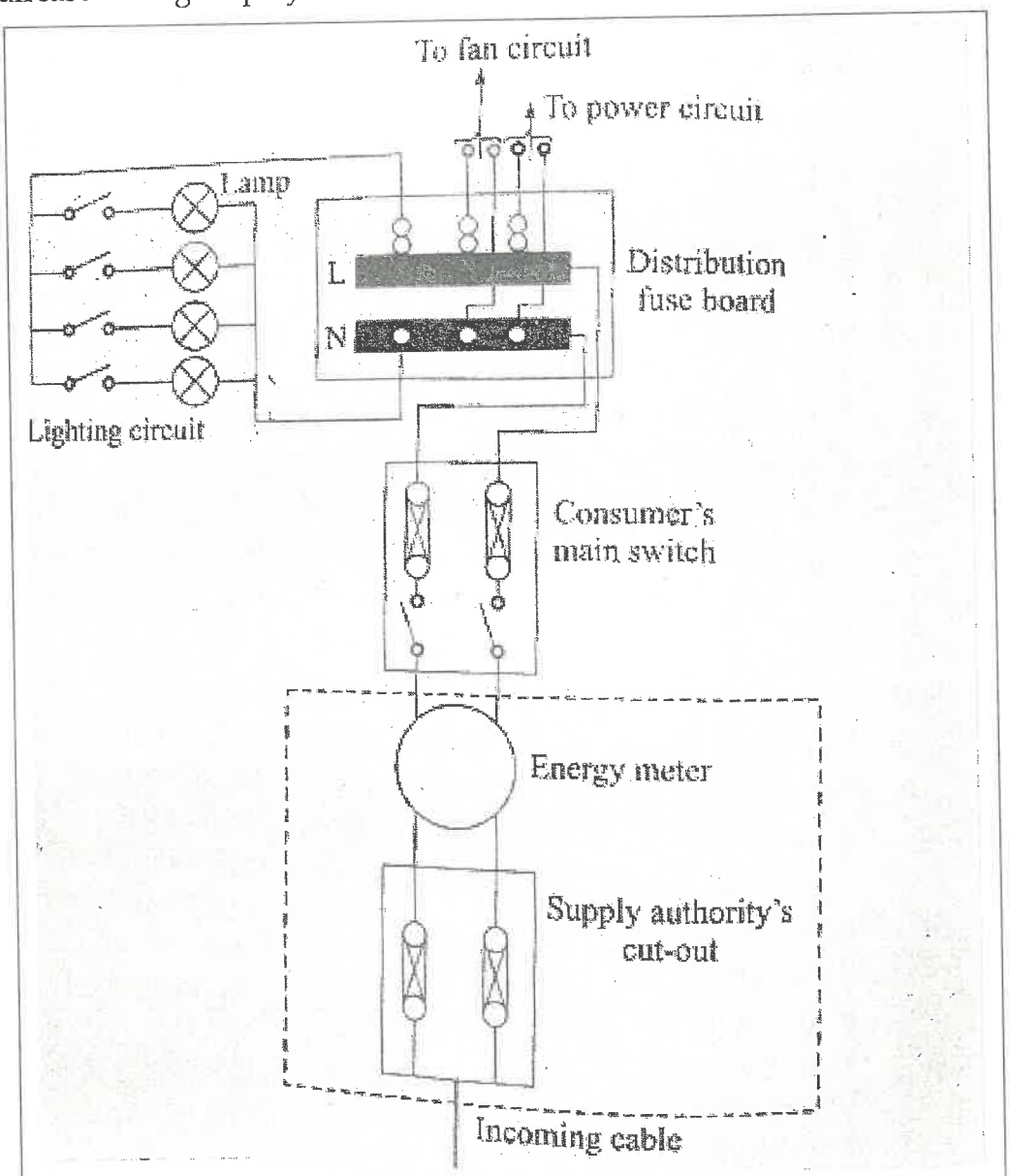
Total copper losses at 75 per cent of full load

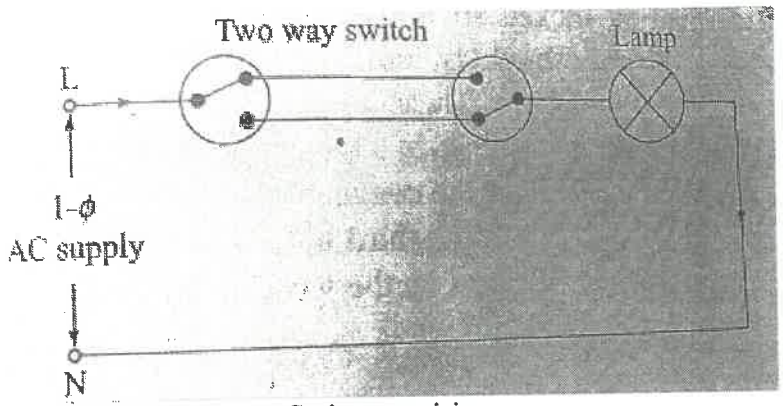
$$= (0.75)^2 \times 37 = 20.8 \text{ W}$$

Efficiency at 75 per cent of full load

$$= \frac{375}{375 + 18.53 + 20.8} \times 100 = 90.5\%$$

Q82) Draw a line diagram/block diagram of system employed for distribution of electrical energy in domestic installation. Also draw a circuit diagram for the staircase wiring employed in multi-storied buildings.





Staircase wiring