# AG:AGRICULTURAL ENGINEERING

*Duration*: Three Hours *Maximum Marks*:100

Please read the following instructions carefully:

**General Instructions:**

1. Total duration of examination is 180 minutes (3 hours).
2. The clock will be set at the server. The countdown timer in the top right corner of screen will display the remaining time available for you to complete the examination. When the timer reaches zero, the examination will end by itself. You will not be required to end or submit your examination.
3. The Question Palette displayed on the right side of screen will show the status of each question using one of the following symbols:


You have not visited the question yet.

You have not answered the question.

You have answered the question.

You have NOT answered the question, but have marked the question for review.

You have answered the question, but marked it for review.

The Marked for Review status for a question simply indicates that you would like to look at that question again. ***If a question is answered and Marked for Review, your answer for that question will be considered in the evaluation.***

**Navigating to a Question**

4. To answer a question, do the following:
   a. Click on the question number in the Question Palette to go to that question directly.
   b. Select an answer for a multiple choice type question. Use the virtual numeric keypad to enter a number as answer for a numerical type question.
   c. Click on **Save and Next** to save your answer for the current question and then go to the next question.
   d. Click on **Mark for Review and Next** to save your answer for the current question, mark it for review, and then go to the next question.
   e. **Caution: Note that your answer for the current question will not be saved, if you navigate to another question directly by clicking on its question number.**
5. You can view all the questions by clicking on the **Question Paper** button. Note that the options for multiple choice type questions will not be shown.

**Answering a Question**

6. Procedure for answering a multiple choice type question:
    a. To select your answer, click on the button of one of the options
    b. To deselect your chosen answer, click on the button of the chosen option again or click on **Clear Response** button
    c. To change your chosen answer, click on the button of another option
    d. To save your answer, you MUST click on the **Save and Next** button
    e. To mark the question for review, click on the **Mark for Review and Next** button. ***If an answer is selected for a question that is Marked for Review, that answer will be considered in the evaluation.***

7. Procedure for answering a numerical answer type question:
    a. To enter a number as your answer, use the virtual numerical keypad
    b. A fraction (eg.,-0.3 or -.3) can be entered as an answer with or without '0' before the decimal point
    c. To clear your answer, click on the **Clear Response** button
    d. To save your answer, you MUST click on the **Save and Next** button
    e. To mark the question for review, click on the **Mark for Review and Next** button. ***If an answer is entered for a question that is Marked for Review, that answer will be considered in the evaluation.***

8. To change your answer to a question that has already been answered, first select that question for answering and then follow the procedure for answering that type of question.

9. Note that ONLY Questions for which answers are saved or marked for review after answering will be considered for evaluation.

**Paper specific instructions:**

1. There are a total of 65 questions carrying 100 marks. Questions are of multiple choice ty numerical answer type. A multiple choice type question will have four choices for the answer w only **one** correct choice. For numerical answer type questions, the answer is a number and no choices will be given**. A number as the answer should be entered** using the virtual keyboard on the monitor.
2. Questions Q.1 – Q.25 carry 1mark each. Questions Q.26 – Q.55 carry 2marks each. The 2marks questions include two pairs of common data questions and two pairs of linked answer questions. The answer to the second question of the linked answer questions depends on the answer to the first question of the pair. If the first question in the linked pair is wrongly answered or is not attempted, then the answer to the second question in the pair will not be evaluated.
3. Questions Q.56 – Q.65 belong to General Aptitude (GA) section and carry a total of 15 marks. Questions Q.56 – Q.60 carry 1mark each, and questions Q.61 – Q.65 carry 2marks each.
4. Questions not attempted will result in zero mark. Wrong answers for multiple choice type questions will result in **NEGATIVE** marks. For all 1 mark questions, ⅓ mark will be deducted for each wrong answer. For all 2 marks questions, ⅔ mark will be deducted for each wrong answer. However, in the case of the linked answer question pair, there will be negative marks only for wrong answer to the first question and no negative marks for wrong answer to the second question. There is no negative marking for questions of numerical answer type.
5. Calculator is allowed. Charts, graph sheets or tables are **NOT** allowed in the examination hall.
6. Do the rough work in the Scribble Pad provided.

**Q. 1 – Q. 25 carry one mark each.**

Q.1 If $\mathbf{P} = \mathbf{A} \times \mathbf{B}$, where $\mathbf{A} = \begin{bmatrix} 2 & 1 \\ 3 & 0 \end{bmatrix}$ and $\mathbf{B} = \begin{bmatrix} 1 & 3 & 0 \\ 2 & 1 & 2 \end{bmatrix}$;
then $\mathbf{P}$ is

(A) $\begin{bmatrix} 7 & 2 \\ 9 & 0 \end{bmatrix}$ (B) $\begin{bmatrix} 4 & 7 & 2 \\ 3 & 9 & 0 \end{bmatrix}$ (C) $\begin{bmatrix} 2 & 4 \\ 3 & 9 \end{bmatrix}$ (D) $\begin{bmatrix} 2 & 4 & 7 \\ 0 & 3 & 9 \end{bmatrix}$

Q.2 If $\mathbf{C} = \mathbf{A} \times \mathbf{B}$, where $\mathbf{A} = 2\mathbf{i} - \mathbf{j} + 3\mathbf{k}$ and $\mathbf{B} = \mathbf{i} + 2\mathbf{j}$;
then $\mathbf{C}$ is

(A) $-6\mathbf{i} + 3\mathbf{j} + 5\mathbf{k}$ (B) $6\mathbf{i} + 3\mathbf{j} - 5\mathbf{k}$ (C) $-6\mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$ (D) $6\mathbf{i} + 2\mathbf{j} + 5\mathbf{k}$

Q.3 The general solution of the differential equation $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} - 4y = 0$ is

(A) $Ae^{x} + Be^{-4x}$ (B) $Ae^{-x} + Be^{4x}$ (C) $Ae^{x} + Be^{4x}$ (D) $Ae^{-x} + Be^{-4x}$

Q.4 Eigenvalues of the matrix $\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}$ are

(A) $\pm 2i$ (B) $2i \pm \sqrt{3}$ (C) $2 \pm i\sqrt{3}$ (D) $2 \pm \sqrt{3}$

Q.5 Poisson distribution having a mean of 5 will have $\sqrt{5}$ as

(A) median
(B) mode
(C) standard deviation
(D) variance

Q.6 During the testing of a spike-tooth type thresher for wheat crop, the throughput and the thresher capacity were found to be 750 kg $h^{-1}$ and 445 kg $h^{-1}$, respectively. The grain-straw ratio (grain : straw) of the crop is 1.5 : 1. Material other than grain (MOG) collected at the main grain outlet is 0.5%. The total grain loss in percentage from all the sources will be

(A) 0.33 (B) 0.50 (C) 1.11 (D) 1.61

Q.7 The rear furrow wheel in a tractor mounted disc plough is provided to

(A) reduce the frictional power loss
(B) maintain the uniform depth of cut
(C) reduce the side draft
(D) improve the penetration of the plough

Q.8 The cumulative discharge of a tractor mounted hydraulic sprayer having 7 nozzles is 2.0 L $min^{-1}$ when the tractor is operated at 4 km $h^{-1}$. If the nozzle spacing is 0.3 m, the discharge in L $ha^{-1}$ is

(A) 1000.02 (B) 285.72 (C) 166.67 (D) 142.86

Q.9 A two-wheel drive tractor, while negotiating a terrain, indicates 100% slip of one of the rear wheels. Under such a condition, the use of differential lock causes

(A) equal speed and equal power distribution to both the drive wheels
(B) equal speed and equal torque distribution to both the drive wheels
(C) equal power and equal torque distribution to both the drive wheels
(D) equal speed and unequal power distribution to both the drive wheels

Q.10 A double acting hydraulic cylinder has a rod diameter equal to one-half the piston diam... system pressure is maintained constant, the ratio of load carrying capacity of extension st... that of retraction stroke is

(A) 0.75 (B) 1.00 (C) 1.33 (D) 4.00

Q.11 During a test, sound level was measured as 90 dB in the operator's cabin on a tractor. Taking reference sound pressure as $2\times10^{-5}$ N m$^{-2}$, the measured RMS sound pressure in N m$^{-2}$ is

(A) 6.32 (B) $6.32\times10^{-1}$ (C) $1.8\times10^{-3}$ (D) $6.32\times10^{-10}$

Q.12 During land leveling of agricultural land for irrigation and drainage purposes, the acceptable deviation in elevation from the design value in metre is

(A) 0.015 (B) 0.025 (C) 0.055 (D) 0.150

Q.13 The gridiron pipe drainage system is more economical than the herringbone pipe drainage system because

(A) it is adopted in the fields which do not require complete drainage
(B) the number of main or sub-main lines is reduced
(C) the number of junctions and the double-drained area are reduced
(D) it has only main or sub-main lines

Q.14 If the drainable porosity of a command area is 5% and the design rate of drop of the water table is 0.25 m day$^{-1}$, the drainage coefficient of the command area in mm day$^{-1}$ will be

(A) 250 (B) 12.5 (C) 1.25 (D) 0.0125

Q.15 A soil has a void ratio of 0.75 and a specific gravity of 2.66. The value of critical hydraulic gradient at which quick sand condition will occur is

(A) 0.95 (B) 1.05 (C) 2.09 (D) 6.64

Q.16 The pressure that does not have any measurable influence on the void ratio or shearing resistance of the soil mass is

(A) pore water pressure (B) intergranular pressure
(C) capillary pressure (D) surcharge pressure

Q.17 The Rational method is used to estimate

(A) runoff volume (B) peak runoff rate
(C) runoff depth (D) direct surface runoff

Q.18 Pan evaporation data recorded at a certain location over a period of one week are 4.0, 4.3, 4.6, 4.9, 5.12, 5.18, and 6.21 mm. If irrigation scheduling based on ratio of irrigation water (IW) to cumulative pan evaporation (CPE) is practiced, the depth of irrigation at an interval of a week for IW/CPE = 0.9 is

(A) 3.60 (B) 4.41 (C) 5.59 (D) 30.88

Q.19 A 16 m high wind break is constructed to protect soil from wind erosion due to wind velocity of 18 m s$^{-1}$ at 15 m height. The minimum wind velocity at 15 m height capable of moving the soil fraction is 8 m s$^{-1}$. The angle of deviation of prevailing wind direction from the perpendicular to the wind break is 30$^{o}$. The distance of full protection from the wind break in m is

(A) 60.44 (B) 104.69 (C) 306.00 (D) 530.01

Q.20 Milk enters into the heating section of a high temperature short time (HTST) pasteuriz... a temperature of 45ºC and leaves at 72ºC. Hot water at temperature of 95 ºC enter... currently into the heat exchanger and leaves at 77ºC. The effectiveness of the heat exchanger...

(A) 0.18 (B) 0.36 (C) 0.54 (D) 0.84

Q.21 The equation representing the heat of respiration ($q$) of fruits and vegetables as a function of temperature ($\theta$) with positive constants $a$ and $b$ is

(A) $q = ae^{b\theta}$ (B) $q = ae^{-b\theta}$
(C) $q = a\ln(b\theta)$ (D) $q = a + b\theta$

Q.22 For an initial spore load equal to 25 spores per container inoculated with *Clostridium botulinum* having $D_{121}$= 0.25 min, the spoilage probability of the container subjected to $F_{121}$ = 1.5 min is

(A) $10^{-5}$ (B) $10^{-6}$ (C) $10^{-8}$ (D) $10^{-9}$

Q.23 Slope and intercept of the BET equation relating $\left[a_w / x(1-a_w)\right]$ and $a_w$, where $a_w$ is water activity and $x$ is the moisture content on dry basis, are 18 and 2, respectively. The values of thermodynamic constant C and BET monolayer moisture content $x_m$ (%) are respectively

(A) 40 and 20 (B) 30 and 15 (C) 20 and 10 (D) 10 and 5

Q.24 A cold storage chamber is constructed with 10 mm mortar, 200 mm brick, 100 mm insulation and 5 mm wood-board having thermal conductivities of 0.8, 1.5, 0.025 and 0.2 W $m^{-1}$ $K^{-1}$, respectively. The resistance of 4 K $m^2$ $W^{-1}$ is offered by

(A) mortar (B) brick (C) insulation (D) wood-board

Q.25 The horse power of the motor running the compressor of a refrigerator having COP of 4.5 and extracting 200 kJ $kg^{-1}$ of evaporating heat with 1.5 kg $min^{-1}$ refrigerant flow rate is

(A) 0.5 (B) 1.0 (C) 1.5 (D) 2.0

## Q. 26 to Q. 55 carry two marks each.

Q.26 $f(x) = e^{-x^2}$ for $x$ = 1.1, 1.2, 1.3, 1.4 and 1.5, the value of $\int_{1.1}^{1.5} f(x)dx$ by Simpson's 1/3rd rule is _____

Q.27 A tractor operated single acting trailing type disc harrow has 8 discs on each gang. The gang angle of both the gangs is maintained at 35º. The horizontal component of resultant soil reaction force on each disc is 600 N and it makes an angle of 30º with the gang axis. If the speed of operation is 6 km $h^{-1}$, the required drawbar power in kW to operate the harrow will be _____

Q.28 A two-wheel drive tractor pulls an implement that has a draft force of 11.5 kN. The total motion resistance of the tractor is 2.5 kN. Under these circumstances, the slip of the drive wheels is 20%. If the power loss in transmission is 20%, the percentage of power lost in converting engine power into drawbar power is _____

Q.29 An unconfined aquifer extends over an area of 1 $km^2$ and has hydraulic conductivity, [illegible] and specific retention of 20 m per day, 30% and 10%, respectively. After pump[illegible] groundwater from this aquifer, the water table dropped to a depth of 20 m from the ground [illegible] the water table was initially at 14.5 m below the ground level, the change in groundwater storag[illegible] million cubic meters would be _____

Q.30 Two parallel canals 50 m apart fully penetrate a homogeneous unconfined aquifer resting on a horizontal impermeable layer. The aquifer has a hydraulic conductivity of 3 m $day^{-1}$ and an effective porosity of 0.25. One-dimensional steady groundwater flow occurs from the upper canal to the lower canal with the height of water levels in the canals 10 m and 8.5 m from the aquifer bottom, respectively. If a sediment layer of 4 cm thick with hydraulic conductivity of $1.2 \times 10^{-2}$ m $day^{-1}$ is ultimately deposited on the inflow face, the groundwater discharge per 1000 m width between the two canals in $m^3$ $day^{-1}$ will be _____

Q.31 The overall heat transfer coefficient based on the outside surface area of a tubular heat exchanger decreased due to fouling during operation from 1000 W $m^{-2}$ $K^{-1}$ to 800 W $m^{-2}$ $K^{-1}$. The fouling film coefficient of the heat exchanger in W $m^{-2}$ $K^{-1}$ is _____

Q.32 A high pressure dairy homogenizer operates under upstream and downstream pressures of 200 and 40 bar respectively homogenizing 30 L of whole milk per hour. Density and specific heat capacity of whole milk are 1030 kg $m^{-3}$ and 3.8 kJ $kg^{-1}$ $K^{-1}$, respectively. Assuming complete energy conservation, the temperature rise of whole milk in degree Celsius is _____

Q.33 A fish fillet of 5 mm thickness having 85% moisture (wet basis) is to be frozen using a plate freezer. The plates are at –35 ºC and the heat transfer coefficient between the fillet and the freezer plates can be assumed to be 2.0 W $m^{-2}$ $K^{-1}$. The initial freezing temperature of fish is –2.5 ºC, latent heat of fusion is 330 kJ $kg^{-1}$, density of fish is 1100 kg $m^{-3}$ and thermal conductivity of frozen fish is 1.5 W $m^{-1}$ $K^{-1}$. The time required to freeze the fillet from the initial freezing temperature in hour(s) is _____

Q.34 Box 1 contains 15 balls out of which 3 are red. Box 2 contains 12 balls out of which 4 are red. If one ball is drawn at random from each box simultaneously, the probability of getting at least one red ball is

(A) 0.07 (B) 0.47 (C) 0.53 (D) 0.75

Q.35 A hemispherical vessel of 300 mm diameter is completely filled with oil and water. If the oil layer is 50 mm deep on the top, the volume of water in the vessel in litres is

(A) 1.27 (B) 3.73 (C) 7.07 (D) 14.14

Q.36 A tractor mounted off-set type reciprocating mower is driven by the PTO shaft. The maximum inertia force of 3.2 kN occurs along the pitman at $32^o$ crank angle and $27^o$ pitman angle with the horizontal plane. The knives of the cutterbar are riveted to the slider. If each of the allowable tensile and compressive stresses of the slider material is 50 MPa, the minimum cross-sectional area of the slider in $mm^2$ is

(A) 29.05 (B) 33.91 (C) 54.27 (D) 57.02

Q.37 The flywheel of a hand operated chaff cutter with two cutting knives is rotated at 3... connected to a worm gear assembly for driving the feed rollers. The number of teeth of... gear is 24 and number of starts (threads) of the worm is 2. If diameter of each of the feed r... 15 cm, the chaff length in mm will be

(A) 9.8 (B) 12.8 (C) 19.6 (D) 39.2

Q.38 A piston pump is driven by a 5 m diameter horizontal axis wind turbine for supplying water from a borehole with a total pump head of 10 m. The mean velocity of air is 18 km $h^{-1}$ and the density of air is 1.29 kg $m^{-3}$. The actual power coefficient of the wind turbine is 0.30 and the overall pump efficiency is 60%. Neglecting the transmission losses, the expected pump discharge in L $s^{-1}$ will be

(A) 2.90 (B) 5.80 (C) 28.50 (D) 32.27

Q.39 A 4-cylinder, 4-stroke compression ignition engine has piston stroke of 10.5 cm and cylinder bore of 11 cm. At a mean piston speed of 7 m $s^{-1}$, the developed brake mean effective pressure is 650 kPa. The brake power in kW developed by the engine is

(A) 39.40 (B) 43.24 (C) 86.48 (D) 172.96

Q.40 A centrifugal pump having an overall efficiency of 75% requires 6 kW power at 1450 rpm to deliver water against a suction head of 5 m and a delivery head of 12 m. If the pump runs at 1650 rpm and frictional head losses are negligible, the total head developed by the pump in metres will be

(A) 22.01 (B) 25.05 (C) 29.35 (D) 31.72

Q.41 A 100 ha watershed received rainfall at a rate of 5 cm $h^{-1}$ for 2 hours. If the runoff generated by the storm was at the rate of 1 $m^3$ $s^{-1}$ for 10 hours, the runoff coefficient for the watershed would be

(A) $3.6 \times 10^{-3}$ (B) $6.0 \times 10^{-2}$ (C) 0.36 (D) 36

Q.42 A 10 ha field has 1.2 m deep layer of sandy loam soil underlain by sandy soil up to a depth of 5 m. A pre-irrigation rainfall brings moisture content of the top 0.3 m layer to its field capacity. The moisture content of rest of the sandy loam layer remains at permanent wilting point. The volumetric moisture content at field capacity and permanent wilting point are 32 and 16%, respectively for the sandy loam soil. The field is irrigated with a stream size of 240 L $s^{-1}$ for 24 hours. Considering the drainage from the sandy loam soil as deep percolation, application efficiency and deep percolation ratio in percent respectively are

(A) 56.40 and 43.60 (B) 69.44 and 30.56 (C) 75.18 and 24.82 (D) 92.60 and 7.40

Q.43 A watershed, with an area of 360 $km^2$, has a triangular shaped 4-h unit hydrograph with a base of 50 hours. The peak discharge of direct runoff hydrograph due to 3 cm of rainfall-excess in 4 hours from the watershed in $m^3$ $s^{-1}$ is

(A) 13.33 (B) 40.00 (C) 120.00 (D) 160.00

Q.44 A rotary dryer is used to dry 1200 kg $h^{-1}$ of paddy containing 30% moisture (wet basis) to give a product containing 15% moisture (wet basis). Alternately, a portion of the dry product may be recycled and mixed with the fresh feed such that the mixed feed enters the dryer with moisture content of 20% (wet basis). The moisture evaporation rate without recycle and the paddy recycle rate in kg $h^{-1}$ respectively in the dryer are

(A) 211.76 and 2400 (B) 211.76 and 600
(C) 256.5 and 2400 (D) 256.5 and 600

Q.45 The work index of a material is 6.25. If 80% of the feed and 80% of the product pas... Sieve No. 340 (3.25 mm opening) and IS Sieve No. 40 (0.42 mm opening), respectively, consumed in kW to crush 5000 kg $h^{-1}$ of sorghum is

(A) 9.77 (B) 20.49 (C) 26.29 (D) 32.29

Q.46 In a screen separator, the mass flow rates of feed, overflow and underflow are 150, 140 and 10 kg $h^{-1}$, respectively. Mass fraction of material in the feed and overflow are 0.9 and 0.96, respectively. The effectiveness of separation in percentage is

(A) 32 (B) 42 (C) 52 (D) 62

Q.47 A milk fat globule of 2 µm diameter is rising in whole milk of density 1030 kg $m^{-3}$ and coefficient of viscosity $10^{-3}$ Poise. If the fat density is 950 kg $m^{-3}$, the time needed to rise 10 mm for this fat globule in min is

(A) 0.57 (B) 34.57 (C) 35.57 (D) 95.57

## Common Data Questions

Common Data for Questions 48 and 49:

A 9 × 20 cm fluted roller type seed drill is operated at a forward speed of 3 km $h^{-1}$ in a field of size 120 m × 90 m. The effective ground wheel diameter of the seed drill is 0.5 m and the ratio of ground wheel rpm to the fluted roller rpm is 2. For one complete rotation of each fluted roller, 6.8 g seed is transferred from the seed box to the seed tube. The average time taken for each turn while operating length-wise is 50 s and the total time wasted in refilling the seed box for sowing the entire field is 40 min.

Q.48 The seed rate in kg $ha^{-1}$ will be

(A) 108.32 (B) 122.55 (C) 136.99 (D) 240.71

Q.49 The actual field capacity of the machine in ha $h^{-1}$ is

(A) 0.30 (B) 0.32 (C) 0.36 (D) 0.40

Common Data for Questions 50 and 51:

Specific heat capacity of dry air and water vapour are 1.005 and 1.88 kJ $kg^{-1}$ $K^{-1}$, respectively. In an energy conserving system, 1 kg $s^{-1}$ air at 30 °C with constant absolute humidity of 0.02 kg water (kg dry air)$^{-1}$ is heated up to 65 °C. Water at the wet bulb temperature of air is then sprayed into the air so that the final temperature of the air-water vapour mixture is 40 °C. Latent heat of vapourization of water at 70 °C and 40 °C are 2334 and 2407 kJ $kg^{-1}$, respectively.

Q.50 The thermal energy supplied per second during heating in kW is

(A) 18.2 (B) 36.5 (C) 101.0 (D) 166.8

Q.51 The absolute humidity of the exhaust air from the spray chamber in kg water (kg dry air)$^{-1}$ is

(A) 0.027 (B) 0.029 (C) 0.031 (D) 0.033

## Linked Answer Questions

Statement for Linked Answer Questions 52 and 53:

A two-wheel drive tractor weighing 21 kN has a wheel base of 2.1 m. The CG of the tractor is 0.7 m ahead of rear axle centre. The tractor is pulling a single-axle trailer with gross trailer weight of 50 kN on a leveled concrete road while maintaining the line of pull parallel to the ground surface. The tractor hitch point is 42 cm behind the rear axle centre and 52.5 cm above the ground surface. During operation, 20% of the gross trailer weight is transferred to the tractor hitch point. If the coefficient of rolling resistance for each of the tractor and trailer wheels is taken as 0.04, and their ground reactions are assumed to pass through their respective wheel centres,

Q.52 the dynamic ground reaction against the tractor rear wheels in kN is

(A) 14.0 (B) 24.0 (C) 24.5 (D) 26.4

Q.53 the gross traction ratio developed by the tractor is

(A) 0.061 (B) 0.082 (C) 0.108 (D) 0.123

Statement for Linked Answer Questions 54 and 55:

In an experimental setup, the discharge through a triangular notch is 0.0074 $m^3 s^{-1}$ at an operating head of 0.1 m. The coefficient of discharge for the notch is 0.7. If the required discharge is 0.1 $m^3 s^{-1}$,

Q.54 the corresponding head in m is

(A) 0.00015 (B) 0.035 (C) 0.283 (D) 67.13

Q.55 the corresponding width of water surface in m is

(A) 0.80 (B) 0.099 (C) 0.00043 (D) 0.00086

## General Aptitude (GA) Questions

## Q. 56 – Q. 60 carry one mark each.

Q.56 If $3 \leq X \leq 5$ and $8 \leq Y \leq 11$ then which of the following options is TRUE?

(A) $\frac{3}{5} \leq \frac{X}{Y} \leq \frac{8}{5}$

(B) $\frac{3}{11} \leq \frac{X}{Y} \leq \frac{5}{8}$

(C) $\frac{3}{11} \leq \frac{X}{Y} \leq \frac{8}{5}$

(D) $\frac{3}{5} \leq \frac{X}{Y} \leq \frac{8}{11}$

Q.57 The Headmaster _____ to speak to you.

Which of the following options is incorrect to complete the above sentence?

(A) is wanting

(B) wants

(C) want

(D) was wanting

Q.58 Mahatama Gandhi was known for his humility as

(A) he played an important role in humiliating exit of British from India.

(B) he worked for humanitarian causes.

(C) he displayed modesty in his interactions.

(D) he was a fine human being.

Q.59 All engineering students should learn mechanics, mathematics and how to do computation.
I II III IV

Which of the above underlined parts of the sentence is not appropriate?

(A) I (B) II (C) III (D) IV

Q.60 Select the pair that best expresses a relationship similar to that expressed in the pair:
**water: pipe**::

(A) cart: road (B) electricity: wire
(C) sea: beach (D) music: instrument

## Q. 61 to Q. 65 carry two marks each.

Q.61 Velocity of an object fired directly in upward direction is given by $V = 80 - 32\,t$, where $t$ (time) is in seconds. When will the velocity be between 32 m/sec and 64 m/sec?

(A) (1, 3/2) (B) (1/2, 1)

(C) (1/2, 3/2) (D) (1, 3)

Q.62 In a factory, two machines M1 and M2 manufacture 60% and 40% of the autocomponents respectively. Out of the total production, 2% of M1 and 3% of M2 are found to be defective. If a randomly drawn autocomponent from the combined lot is found defective, what is the probability that it was manufactured by M2?

(A) 0.35 (B) 0.45 (C) 0.5 (D) 0.4

Q.63 Following table gives data on tourists from different countries visiting India in the year

| Country | Number of Tourists |
|---|---|
| USA | 2000 |
| England | 3500 |
| Germany | 1200 |
| Italy | 1100 |
| Japan | 2400 |
| Australia | 2300 |
| France | 1000 |

Which two countries contributed to the one third of the total number of tourists who visited India in 2011?

(A) USA and Japan

(B) USA and Australia

(C) England and France

(D) Japan and Australia

Q.64 If $|-2X + 9| = 3$ then the possible value of $|-X| - X^2$ would be:

(A) 30 (B) -30 (C) -42 (D) 42

Q.65 All professors are researchers
Some scientists are professors

Which of the given conclusions is logically valid and is inferred from the above arguments:

(A) All scientists are researchers

(B) All professors are scientists

(C) Some researchers are scientists

(D) No conclusion follows

**END OF THE QUESTION PAPER**

# GATE 2013 : Answer keys for AG - Agricultural Engineer

| Paper | Q.No | Key(s)/Value(s) |
|---|---|---|
| AG | 1 | B |
| AG | 2 | A |
| AG | 3 | B |
| AG | 4 | D |
| AG | 5 | C |
| AG | 6 | D |
| AG | 7 | C |
| AG | 8 | D |
| AG | 9 | D |
| AG | 10 | C |
| AG | 11 | B |
| AG | 12 | A |
| AG | 13 | C |
| AG | 14 | B |
| AG | 15 | A |
| AG | 16 | A |
| AG | 17 | B |
| AG | 18 | D |
| AG | 19 | B |
| AG | 20 | C |
| AG | 21 | A |
| AG | 22 | B |
| AG | 23 | D |
| AG | 24 | C |
| AG | 25 | C |
| AG | 26 | 0.08 to 0.09 |
| AG | 27 | 14.4 to 14.6 |
| AG | 28 | 47.4 to 47.5 |
| AG | 29 | 1100000 |
| AG | 30 | 690 to 695 |
| AG | 31 | 4000 |
| AG | 32 | 4 to 4.2 |
| AG | 33 | 3.25 to 3.35 |
| AG | 34 | B |
| AG | 35 | B |

| Paper | Q.No | Key(s)/Value(s) |
|---|---|---|
| AG | 36 | D |
| AG | 37 | C |
| AG | 38 | A |
| AG | 39 | B |
| AG | 40 | A |
| AG | 41 | C |
| AG | 42 | B |
| AG | 43 | C |
| AG | 44 | A |
| AG | 45 | A |
| AG | 46 | D |
| AG | 47 | D |
| AG | 48 | A |
| AG | 49 | B |
| AG | 50 | B |
| AG | 51 | C |
| AG | 52 | D |
| AG | 53 | C |
| AG | 54 | C |
| AG | 55 | A |
| AG | 56 | B |
| AG | 57 | C |
| AG | 58 | C |
| AG | 59 | D |
| AG | 60 | B |
| AG | 61 | C |
| AG | 62 | C |
| AG | 63 | C |
| AG | 64 | B |
| AG | 65 | C |